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NATIONAL COMMISSION ON AIR QUALITY

OHIO RIVER VALLEY REGIONAL STUDY

ANALYSIS OF THE AIR QUALITY PLANNING PROCESS IN THE OHIO RIVER VALLEY REGION

COMPLETED

ORIGINAL

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July 1980

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OHIO RIVER VALLEY REGIONAL STUDY

ANALYSIS OF THE AIR QUALITY PLANNING PROCESS IN THE OHIO RIVER VALLY REGION

PEDCo SUMMARY

Project Manager: John Thomasian
Contractor: PEDCo Environmental, Inc.

When promulgated, National Ambient Air Quality Standards for criteria pollutants required the Governors of the States of Indiana, Ohio, and the Commonwealth of Kentucky to submit State Implementation Plans (SIP's) to the Administrator of the Environmental Protection Agency (EPA) by January 31, 1972. More recently, the Clean Air Act Amendments of 1977 required that revisions to the SIP's for designated nonattainment areas for any criteria pollutant be submitted to the Administrator by July 1, 1979. The purpose of this report is to describe the planning process that led to the submission of these SIP revisions.

The report also presents the results of an analysis (which was submitted to the Administrator) of the planning process that preceded SIP revisions. Even more important, it presents a compilation of information obtained through interviews with representatives of agencies, institutions, and organizations involved in the entire SIP process. More than 80 individuals were interviewed; 18 of these were by telephone only. Those interviewed included representatives of Federal, state, and local regulatory agencies; environmental organizations; local industries; metropolitan planning organizations; and state departments of transportation.

A
B

Although the SIP planning process is a joint effort involving Federal, state, and local governmental agencies and institutions, Section 110(a)(1) of the Clean Air Act (CAA) specifically places responsibility for adoption and submission of the SIP with the state. Within the three-state area encompassed by the Ohio River Valley Study, however, the Commonwealth of Kentucky and the State of Ohio have both delegated responsibility for preparation of portions of the SIP's to local air pollution control agencies and metropolitan planning agencies. Authority for approval of the SIP rests with the Administrator of the EPA.

Governmental agencies and institutions throughout the three-state study area shared similar problems in the preparation of SIP's. The lack of cooperation and consultation between regulatory agencies in adjoining states was considered by many to be a major problem. The lack of consistency among the SIP's for interstate areas is reflected in two petitions to the EPA Administrator for findings in interstate disputes over emissions from coal-fired boilers at electric generating plants.

Other problems of general concern in the SIP planning process include:

- Lack of adequate guidelines from the EPA
- Insufficient manpower resources
- Inadequate time schedules provided in the CAA for a thorough analysis of alternative control strategies
- Lack of appropriate data to apply complex dispersion models to assess air quality impacts.

Section 121 of the Clean Air Act requires the state to provide for consultation with local governments, organizations of elected officials, and Federal land managers and for public hearings on regulations contained in the SIP. Those interviewed during the study agreed that each state agency had provided adequate opportunity for consultation and public hearing. Public meetings were held throughout the SIP planning process. Metropolitan planning organizations and state regulatory agencies published periodic newsletters, conducted workshops, and distributed printed literature to keep the various interest groups abreast of issues and the progress being made in their resolution.

Although the opportunity for public participation was readily available, actual public involvement was very limited. Representatives of public interest groups explained that many of those concerned about the SIP planning process did not have the time and, in some cases, sufficient scientific knowledge to understand the highly technical nature of many of the issues. On the other hand, technical experts employed by large industrial corporations to study the issues and make recommendations that best serve company interests have the time and expertise to keep abreast of the state-of-the-art in control technology development and meteorological dispersion modeling for assessing the air quality impact of proposed regulations.

Individuals contacted during the course of this project identified a number of technical, legal, and administrative issues that may determine whether or not the goals of the Clean Air Act will be achieved. There issues include:

- Regional inconsistencies - Policies of the two EPA Regional Offices are not always the same.

- Monitoring versus modeling data - A consistent policy needs to be developed on the use of air quality monitoring data and dispersion modeling data in the SIP/PSD* planning and implementation process.

- Class A dispersion coefficients - Because of the disputes over the appropriateness of Class A stability dispersion parameters, a detailed investigation of their use should be conducted promptly.

- Designation of attainment status - Some individuals contacted during the study questioned the use of modeling data that in some instances resulted in a designation of nonattainment even though available air quality data did not support such a designation.

- Inspection and maintenance - Representatives of local governmental agencies were disturbed by the inability of the state legislature to pass an acceptable inspection and maintenance program to control emissions from motor vehicles. Several communities in the Kentucky portion of the Cincinnati metropolitan area have stated their intentions to take the issue into the Courts and risk EPA sanction.

- PSD regulations - Industry representatives stated that the complexity of PSD regulations imposes an unnecessary burden on their plans for plant expansion. Concerns were voiced over both the cost of preparation of the PSD permit application and the time required to complete the entire PSD process.

- Emission offsets and PSD increments - Consistent policies need to be developed relative to banking and trading emission offsets and to the tracking of PSD increment consumption.

The Administrator has received two petitions for findings in interstate disputes, as provided for in Section 126 of the Clean Air Act. Both petitions allege that sulfur dioxide emissions from coal-fired electric generating plants in Indiana prevent the attainment of maintenance of National Ambient Air Quality Standards

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* Prevention of Significant Deterioration.

in Kentucky. The first petition involves the American Electric Power Company Clifty Creek Plant in Jefferson County, Indiana; the second concerns the Gallagher Power Station of the Public Service of Indiana, which is located in Floyd County, Indiana, across the Ohio River from Louisville, Kentucky. Public hearings have been held on both petitions, but the Administrator has not announced the findings.

In both petitions the position of the affected utility was it had not been demonstrated that emissions from the plant prevent attainment or maintenance of National Primary or Secondary Ambient Air Quality Standards in Kentucky. They concluded that without such demonstration there was no basis for a petition under Section 126. Also, questions were raised in both petitions regarding the appropriateness of the use of Class A stability dispersion coefficients for modeling air quality impact.

Section 126(b) provides that within 60 days after receipt of any petition and after public hearing, the Administrator shall make a finding or deny the petition. Experience with the two petitions named shows that 1 year or more is required for the Administrator to reach a decision. Even more important, individuals contacted during the course of this study were of a common opinion that a final settlement of there disputes will be reached only after extensive litigation in the Courts.

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ABBREVIATIONS

APCA	Air Pollution Control Agency
AQCR	Air Quality Control Region
AQDM	Air Quality Display Model
CAA	Clean Air Act
CAAS	Clean Air Act Subcommittee
CDM	Climatological Dispersion Model
CM	Census of Manufacturers
DOE	Department of Energy
DOT	Department of Transportation
EKMA	Empirical Kinetic Modeling Approach
EIS	Environmental Impact Statement
ESECA	Energy Supply and Environmental Coordination Act
GEP	Good Engineering Practice
IKEC	Indiana-Kentucky Electric Corporation
I/M	Inspection and Maintenance
KDNREP	Kentucky Department of Natural Resources and Environmental Protection
KIPDA	Kentucky-Indiana Regional Planning and Development Agency
LG&E	Louisville Gas and Electric
MCDM	Modified Climatological Dispersion Model
MGTCC	Montgomery-Greene Transportation Coordinating Committee
MPO	Metropolitan Planning Organization
MVRPC	Miami Valley Regional Planning Commission
NAAQS	National Ambient Air Quality Standards
NCAQ	National Commission on Air Quality
NOAA	National Oceanic and Atmospheric Administration
OKI	Ohio, Kentucky, Indiana Regional Council of Governments
OPEC	Organization of Petroleum Exporting Countries
PSD	Prevention of Significant Deterioration
P&I	Public Service of Indiana
RACT	Reasonably Available Control Technology
RAM	Real-time Air Quality Simulation Model
RAMR	Real-time Air Quality Simulation Model - Rural
RAPCA	Regional Air Pollution Control Agency
SAMWG	Standing Air Monitoring Work Group
SAROAD	Storage and Retrieval of Aeromatic Data
SIP	State Implementation Plan
SMSA	Standard Metropolitan Statistical Area
TCM	Transportation Control Measures
TIP	Transportation Improvement Program
TPC	Transportation Policy Committee
TSM	Transportation System Management
VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

ACKNOWLEDGMENT

This report was prepared for the National Commission on Air Quality by PEDCo Environmental, Inc., Cincinnati, Ohio. Mr. John Thomasian was the Project Coordinator for the National Commission. Mr. Charles E. Zimmer served as the PEDCo Phase Coordinator. Principal authors of the report included Mr. D. Dunbar, Mr. T. Bertke, Mr. G. Schewe, Ms. M. Taft, and Mr. J. Wunderle.

SECTION 1

INTRODUCTION

The Congress of the United States adopted the Clean Air Act (CAA) in 1963 (P.L. 88-206). Amendments to the CAA were made by the Motor Vehicle Air Pollution Control Act in 1965 (P.L. 89-272); the Clean Air Act Amendments of 1966 (P.L. 89-65); the Air Quality Act of 1967 (P.L. 90-148); the Clean Air Act Amendments of 1970 (P.L. 91-604); the Comprehensive Health Manpower Training Act of 1971 (P.L. 92-157); the Energy Supply and Environmental Coordination Act of 1974 (P.L. 93-319); Clean Air Act Amendments of 1977 (P.L. 95-95) and Safe Drinking Water Act of 1977 (P.L. 95-190).

Section 109 of the CAA requires the Administrator of the Environmental Protection Agency (EPA) to promulgate primary and secondary national ambient air quality standards (NAAQS) for each air pollutant for which air quality criteria have been issued. Within 9 months after the promulgation of an NAAQS, Section 110 of the CAA requires that each state adopt and submit to the Administrator a plan which provides for the implementation, maintenance, and enforcement of the NAAQS. National ambient air quality standards for suspended particulate matter, sulfur dioxide (SO_2), nitrogen dioxide (NO_2), carbon monoxide (CO), photochemical oxidants, and hydrocarbons (HC) were promulgated by the Administrator on November 25, 1971. States were required to submit

Statewide Implementation Plans (SIP's) for these pollutants no later than January 31, 1972.

The Clean Air Act Amendment of 1977 recognized the fact that the NAAQS had not been attained by the dates set forth in the original SIP submissions. Section 172 of the CAA requires the submission of an SIP revision as a precondition for the construction or modification of any major stationary source on or after July 1, 1979, for any area designated as nonattainment for any NAAQS. The revised SIP must demonstrate attainment of national primary air quality standards no later than December 31, 1982. An exception is given for photochemical oxidants and carbon monoxide to extend the deadline for attainment to December 31, 1987. To qualify for this extension, the SIP must demonstrate attainment as expeditiously as possible and include the implementation of reasonably available control measures for all sources of emissions of reactive hydrocarbons and carbon monoxide.

A provision is made in the CAA (Section 176) for the Administrator to impose sanctions in the event a state fails to submit an acceptable SIP. Such sanctions include the withholding of Federal funds to the affected state.

Section 323 of the CAA mandates the establishment of a National Commission on Air Quality (NCAQ) responsible for reporting to the Congress whether or not the provisions of the CAA are sufficient to achieve the national air quality goals. The Commission must report its findings to the Congress by 1981.

The mandate for the NCAQ covers a wide range topics for study that are of interest to the Congress including:

- Available alternatives including enforcement mechanisms to protect and enhance air quality.
- Economic, technological, and environmental consequences of achieving or not achieving the purposes of the CAA.
- Technological capability of achieving and the economic, energy, environmental, and health effect of not achieving required emission reductions of oxides of nitrogen.
- Air pollutants not presently regulated that pose a threat to health and welfare.
- The adequacy of research, development, and demonstrations being carried out by Federal, state, local, and nongovernmental entities to protect and enhance air quality.
- The ability of Federal, state, and local institutions to implement the purposes of the CAA.
- The extent to which the reduction of hydrocarbon emissions is an adequate or appropriate method to achieve primary standards for photochemical oxidants.
- The special problems of small business and government agencies in obtaining reductions of emissions from existing sources in order to offset increases in emissions from new sources.

The NCAQ has funded a series of studies that cover the areas of interest of the Congress. Included in these studies are five regional investigations being conducted to determine the actual experiences of regulatory agencies and planning institutions in implementing their responsibilities under the Clean Air Act. Regional studies are being conducted in the following areas:

- South Coast Air Basin/Kern County Region of California.
- New York City/Hartford, Connecticut, Region.
- The Four Corners Region.

- Minneapolis-St. Paul, Minnesota, Region.
- Ohio River Valley Region.

1.1 OBJECTIVES OF THE OHIO RIVER VALLEY REGION STUDY

The primary objective of this study is to review the planning process that leads to the submission of the SIP and to determine whether or not the NAAQS will be attained and maintained within the study area. If it is determined that the NAAQS will not be attained, the extent of further emission reduction will be specified. A secondary, but equally important, objective of this study is to determine the extent of further revision of the SIP that may be necessary to respond to changes in growth patterns, sources of energy, and policy alternatives which may be adopted by Federal, state, and local control agencies.

The scope of work to be performed during the course of this study includes three major phases. Phase I, Regional SIP Evaluation includes an investigation of the overall SIP planning and implementation process. It includes a determination as to whether or not the NAAQS will be attained by 1982 or 1987, as required by the CAA. Phase II, Analysis of Alternative Measures for Emission Reduction, focuses on the analysis of alternative measures for emission reduction and the ability of the SIP to react to alternative development scenarios that may result from changing energy sources and economic growth rates. Phase III, Analysis of Policy Alternatives, looks at the ability of the SIP to respond to various policy alternatives that may be chosen by Federal, state, and local control agencies.

1.2 DESCRIPTION OF STUDY AREA

The Ohio River Valley Basin study region covers the corridor of counties along the Ohio River between Cincinnati and Louisville. The study area encompasses the Cincinnati Standard Metropolitan Statistical Area (SMSA), Dayton SMSA, Louisville SMSA, and Butler County. Figure 1-1 illustrates all counties located within this study region.

Based on 1975 population estimates,[1] the region has a population of 3,401,445. Population densities range from 44 people per square mile in Gallatin County, Kentucky, to 2175 people per square mile in Hamilton County, Ohio. This range reflects the highly diversified nature of the study region.

The region varies from rural areas based primarily on agricultural activities to highly industrial urbanized areas. In general, the region can be characterized by a high concentration of power plants and industrial facilities located along or near the Ohio River. Within the boundaries of the study region, there are 11 coal-fired power plants (50 MW or greater) operating along the river. This does not include the three coal-fired and two nuclear power plants presently under construction.

The major polluting sources in the region include utility and industrial coal-fired boilers, painting operations, motor vehicle and equipment production, steel mills, appliance manufacturing, chemical production, petroleum shipping and storage, storage and transportation of bulk materials, printing and publishing, and paper and allied products. There are a total of 19

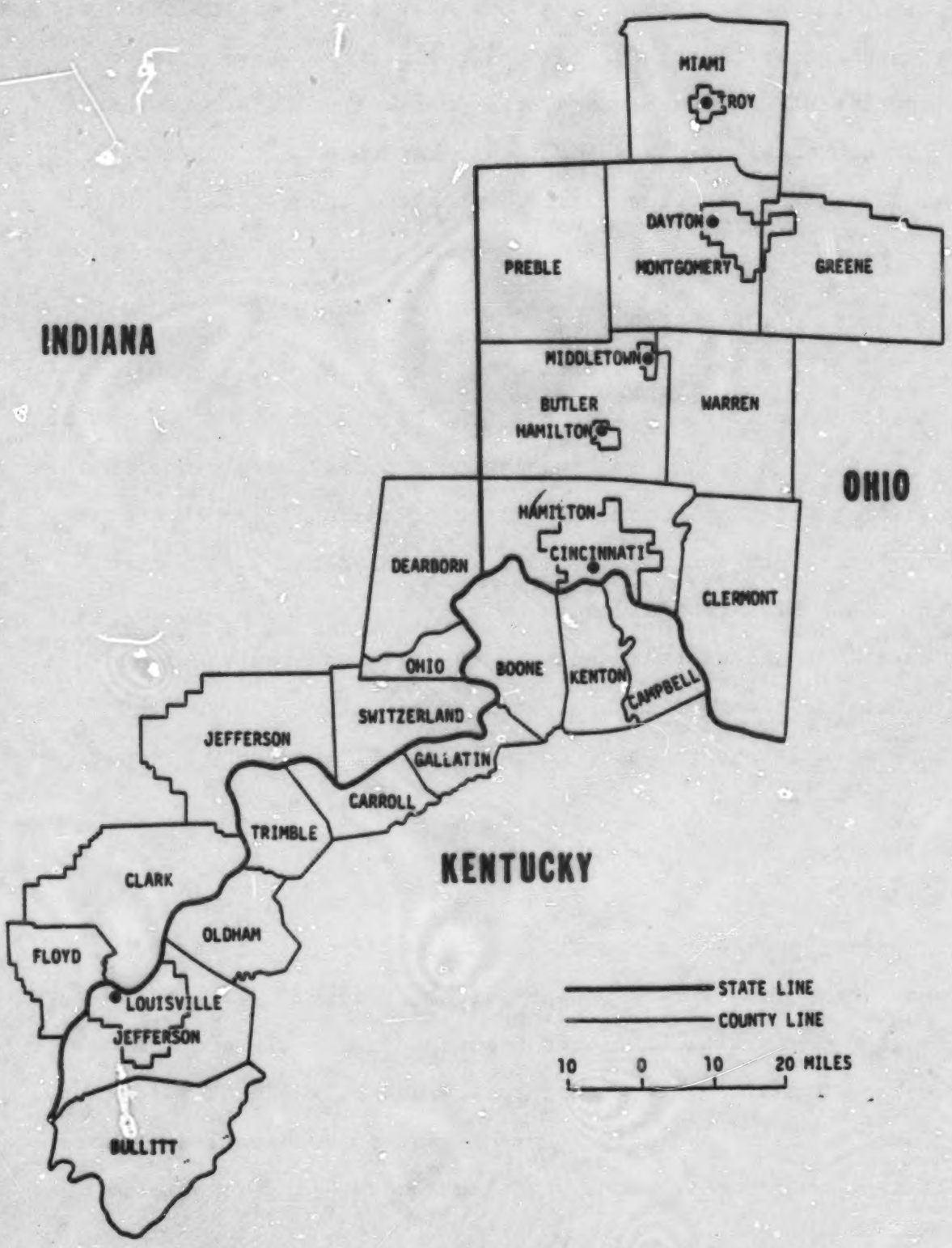

Figure 1-1. Counties along the Ohio River.

counties with nonattainment area designations. Some of these nonattainment areas are for several pollutants. For instance, Louisville and Cincinnati have areas designated as nonattainment for photochemical oxidants and total suspended particulates. Louisville also has a large area designated as nonattainment for sulfur dioxide.

1.3 PURPOSE OF THIS REPORT

Following the promulgation of National Ambient Air Quality Standards for criteria pollutants, the Governors of the States of Indiana, Ohio, and the Commonwealth of Kentucky were required to submit Statewide Implementation Plans to the Administrator of the EPA no later than January 31, 1972. More recently, as a result of the Clean Air Act Amendments of 1977, revisions to the SIP's for areas designated as nonattainment were required to be submitted to the Administrator no later than July 1, 1979. The purpose of this report is to describe the SIP planning process that lead to the submission of these SIP revisions.

This report presents the results of an analysis of the SIP revisions submitted to the Administrator, but more importantly the report represents a compilation of information obtained through interviews with representatives of agencies, institutions, and organizations involved in the entire SIP process. More than 80 individuals were interviewed, of which 18 were contacted by telephone only. Persons interviewed included representatives of Federal, state, and local regulatory agencies;

environmental organizations, local industries, metropolitan planning organizations, and state departments of transportation.

It is the purpose of this report to identify issues that were raised by the various interested groups and how these issues were resolved. Included in the report is a discussion of the resources, time, and proper guidelines that are needed to prepare the SIP's. The flexibility of the SIP to changing requirements is also discussed. A discussion is presented of the availability of adequate data and the appropriateness of the ways in which such data were used to support conclusions. Special attention is directed to an evaluation of the Section 126 (CAA) actions involving interstate disputes along the Ohio River between Louisville and Cincinnati. Finally the report describes the application of air quality models, assumptions used in applying such models, program and policy issues evaluated in each model application, and the impact of such modeling upon emission limitations, control strategies, and air quality projections.

REFERENCES FOR SECTION 1

1. County and City Data Book, 1977, A Statistical Abstract Supplement. U.S. Department of Commerce, Bureau of the Census, U.S. Government Printing Office. Washington, D.C. 1978.

SECTION 2

STATUS OF 1979 SIP REVISIONS

It should be noted that the status of these SIP revisions is a dynamic process and constantly changing. The U.S. EPA has been exerting pressure on the states to submit each portion of their SIP and to ensure that legislation is available to provide the statutory authority necessary to implement and enforce all aspects of the SIP. Therefore, much of what is written in the following subsections most likely will be outdated by the time of publication.

2.1 INDIANA

The State of Indiana has submitted or is in the process of submitting specific work elements of its SIP. The SIP has been broken down by county and pollutant. Each piece is submitted to EPA Region V soon after it has been reviewed and approved by the State's Air Pollution Control Board. All Indiana counties within the study area have been designated as either attainment or unclassified for SO_2 and NO_2. Several areas have been designated nonattainment for total suspended particulate (TSP) and ozone (O_x). Tables 2-1 through 2-4 present the attainment/nonattainment status for these counties.

TABLE 2-1. TOTAL SUSPENDED PARTICULATE ATTAINMENT STATUS OF INDIANA COUNTIES

Designated area	Attainment	Nonattainment	Unclassified
Clark County			
Charlestown, Jeffersonville, Silver Creek, and Utica Townships		x	
Remainder of Clark County	x		
Dearborn County			
Center, Hogan, Lawrenceburg, and Manchester Townships		x	
Remainder of Dearborn County	x		
Floyd County			x
Jefferson County			x
Ohio County	x		
Switzerland County	x		

TABLE 2-2. SULFUR DIOXIDE ATTAINMENT STATUS OF INDIANA COUNTIES

Designated area	Attainment	Nonattainment	Unclassified
Clark County	x		
Dearborn County			x
Floyd County	x		
Jefferson County			x
Ohio County	x		
Switzerland County	x		

TABLE 2-3. OZONE ATTAINMENT STATUS OF INDIANA COUNTIES

Designated area	Attainment	Nonattainment	Unclassified
Clark County		x	
Dearborn County			x
Floyd County		x	
Jefferson County			x
Ohio County			x
Switzerland County			x

TABLE 2-4. NITROGEN DIOXIDE ATTAINMENT STATUS OF INDIANA COUNTIES

Designated area	Attainment	Nonattainment	Unclassified
Clark County			x
Dearborn County			x
Floyd County			x
Jefferson County			x
Ohio County			x
Switzerland County			x

Some work elements of the TSP SIP have been submitted, but most elements have not completed the State public hearing and review process. Ohio and Switzerland Counties are classified as attainment and therefore come under the Statewide Strategy. Floyd and Jefferson Counties are designated as unclassified and will also come under the Statewide Strategy unless they are redesignated. The Dearborn County TSP SIP has been submitted to Region V; however, Indiana has decided to revise the reasonably available control technology (RACT) determinations for small boilers. The emission limitations are being changed because they were determined to be too stringent. The State Air Pollution Control Board is expected to vote on the final adoption at their next meeting. Resubmittal to Region V is anticipated in August 1980. The Clark County TSP SIP is going through the State-review process. Preliminary adoption by the Air Pollution Board is expected July 2, 1980; a public hearing will be held sometime towards the end of August; and final adoption by the Board is anticipated in either September or October. The plan should be submitted to Region V by January 1981.

Clark, Floyd, Switzerland, and Ohio Counties are classified as attainment areas for SO_2; Dearborn and Jefferson Counties are presently designated as unclassified. Each of these counties comes under the Statewide strategy. According to Region V, there is a strong possibility that Floyd County will be redesignated as nonattainment f r SO_2 in the next few months. Jefferson County was shown to exceed the NAAQS for SO_2, through the State's

dispersion modeling, and could possibly be reclassified depending on the outcome of litigation in Ohio. The exceedance of the standard occurred only under Class A Stability. Authorities in Indiana believe that because of the low probability of occurrence of Class A stability, the results of the dispersion modeling are not sufficient reason to reclassify Jefferson County as nonattainment for SO_2.

The State of Indiana has submitted its ozone SIP for Clark and Floyd Counties to Region V. (These are the only two nonattainment areas in Indiana's portion of the study region.) The transportation portion of the ozone SIP was determined to have certain deficiencies, and the State is in the process of correcting these problems. Region V is currently reviewing the stationary source (RACT-related) portion of the ozone SIP and has not proposed any rulemaking in the Federal Register.

All Indiana counties within the study region are considered unclassified for NO_2, and the State does not plan to submit any control strategies to Region V.

2.2 KENTUCKY

Region IV of EPA has proposed to disapprove some revisions to the Kentucky Clean Air Act State Implementation Plan and conditionally approve others. Several areas have been designated as nonattainment for primary and secondary standards for TSP, SO_2, and O_x (Tables 2-5 through 2-8).

The ozone SIP has been conditionally approved. Prior to final approval, EPA will require the State to pass legislation to

TABLE 2-5. TOTAL SUSPENDED PARTICULATE ATTAINMENT STATUS OF KENTUCKY COUNTIES

Designated area	Attainment	Nonattainment	Unclassified
Boone County	x		
Bullitt County			
Subarea of Bullitt County in Shepherdsville		x	
Remainder of Bullitt County	x		
Campbell County			
Subarea of Campbell County in Newport		x	
Remainder of Campbell County	x		
Carroll County	x		
Gallatin County	x		
Jefferson County		x	
Kenton County	x		
Oldham County	x		
Trimble County	x		

TABLE 2-6. SULFUR DIOXIDE ATTAINMENT STATUS OF KENTUCKY COUNTIES

Designated area	Attainment	Nonattainment		Unclassified
		Primary	Secondary	
Boone County	x			
Bullitt County	x			
Campbell County	x			
Carroll County	x			
Gallatin County	x			
Jefferson County		x	x	
Kenton County	x			
Oldham County	x			
Trimble County	x			

TABLE 2-7. OZONE ATTAINMENT STATUS OF KENTUCKY COUNTIES

Designated area	Attainment	Nonattainment	Unclassified
Boone County		x	
Bullitt County			x
Campbell County		x	
Carroll County			x
Gallatin County			x
Jefferson County		x	
Kenton County		x	
Oldham County			x
Trimble County			x

TABLE 2-8. NITROGEN DIOXIDE ATTAINMENT STATUS OF KENTUCKY COUNTIES

Designated area	Attainment	Nonattainment	Unclassified
Boone County			x
Bullitt County			x
Campbell County			x
Carroll County			x
Gallatin County			x
Jefferson County			x
Kenton County			x
Oldham County			x
Trimble County			x

ensure an adequate inspection and maintenance program for motor vehicles, to include a program for selecting a package of transportation control measures to attain emissions reduction targeted in the SIP, and to include modifications or improvements in the public transportation program to allow extension to the end of 1987--the deadline for attainment of ozone in Louisville and Northern Kentucky.

The TSP SIP has been submitted to Region IV for review. This SIP will be reproposed by the State in order to redefine EPA's position on RACT determinations. The State has been required to revise its regulations to achieve RACT requirements for the determination of opacity from certain steel plants. The nonsteel portion has received several substantial comments that must be taken into consideration. Region IV will soon propose to conditionally approve or possibly completely approve the TSP SIP in the near future.

Region IV believes Kentucky's TSP nonattainment problem is being caused by nontraditional sources. The Kentucky Department of Natural Resources and Environmental Protection (KDNREP) will conduct a study of fugitive dust emissions before developing and implementing an effective control program subject to EPA approval.

The SO_2 SIP will not receive approval until the State revises certain compliance schedules. The EPA determined that Section 8(2)(d) of the regulations improperly allowed extensions of the compliance date for sources that are not subject to more

stringent emissions limits by the revised SIP. The EPA has proposed to disapprove these compliance schedules.

2.3 OHIO

Region V has not proposed to approve or disapprove any portions of the Ohio SIP. Ohio seems to have fallen behind in submitting certain portions of its SIP and has failed to provide all the necessary background data required by Region V on other sections. Several areas have been proposed as nonattainment for primary and secondary standards for TSP, SO_2, and O_x (Tables 2-9 through 2-12).

The particulate portion of the SIP for the counties of concern in Ohio has not yet been submitted to the U.S. EPA. This portion of the SIP is currently being reviewed by Ohio's Legislative Rules Committee. Background and support data are still being generated for submittal. The Ohio EPA (OEPA) expects that final approval will not occur until January 1981. The expected attainment dates are December 31, 1982, for the primary standard and December 31, 1987, for the secondary standard.

The SO_2 portion of the SIP has been submitted. However, Region V has requested detailed backup information. The OEPA is in the process of preparing a package responding to the informational request.

The oxidant portion of the SIP has been submitted, and approval should be forthcoming as it now stands.

TABLE 2-9. TOTAL SUSPENDED PARTICULATE ATTAINMENT STATUS OF OHIO COUNTIES

Designated area	Attainment	Nonattainment		
		Primary	Secondary	Unclassified
Butler County				
City of Middletown		x		
Cities of Monroe, Trenton, New Miami, and Fairfield; that portion of the city of Hamilton within Fairfield Township; and the townships of Madison, Lemon, St. Clair, Liberty, Fairfield, and Union			x	
Remainder of Butler County	x			
Clermont County				
Pierce and Batavia Townships			x	
Remainder of Clermont County	x			
Greene County				
Subarea including the areas west of the line determined by the following: Meredith Rd. south from the Greene-Clark County Line (which converts to S.R. 370) to Bryan Park Rd., southeast to Clifton Rd., southwest to Rt. 68, south to Rt. 235, northwest to Hill Top Rd., southwest to Fairground Rd., west to Beaver Valley Rd., south to Lantz Rd., west to Fairfield Rd., south to Sweigart Rd., southwest to Little Sugarcreek Rd., south to Feed Wire Rd., east to Mead Rd., south to Mill Rd., south on Mill Rd., then east to Lower Bellbrook Rd., northeast to Schnebly Rd., southeast on Schnebly Rd., then south to S.R. 725, east on S.R. 725 to the residential area of Spring Valley, then on the road that becomes Spring Valley-Paintersville Rd., through residential area to Cornstalk Rd., south to Greene-Warren County Line			x	
Remainder of Greene County	x			

(continued)

TABLE 2-9 (continued)

Designated area	Attainment	Nonattainment: Primary	Nonattainment: Secondary	Nonattainment: Unclassified
Hamilton County				
Subarea bounded on the east by I-71, on the south by the Ohio River, on the west by the Cincinnati City Limits, and on the north by the north and west boundaries of the cities of Cincinnati, Lockland, Lincoln Hts., Evendale, and Blue Ash		x		
Subarea south and east of U.S. 50, and north and east of S.R. 125, and an area to the north, including the cities of Forest Park, Greenhills, Mt. Healthy, North College Hill, Wyoming, Woodlawn, Glendale, Springdale, Sharonville, and Loveland, and the Townships of Colerain, Springfield, Sycamore, and Symmes	x			
Remainder of Hamilton County			x	
Miami County				
City of Piqua		x		
Subarea north of the line determined by Fenner Rd. from the Darke-Miami County Line east to Pemberton Rd., south to Horse Shoe Bend Rd., east to Rt. 55, northeast on Rt. 55 through Troy to Troy-Urban Rd., northeast on Troy-Urban Rd. to Miami-Champaigne County Line, and south of the line determined by Rt. 40 north from the Montgomery-Miami County Line to Rt. 202, north to Rt. 571, east to Rt. 201, north to Rt. 41, east to the Miami-Clark County Line, and excluding the city of Piqua				
Remainder of Miami County	x			
Montgomery County				
Cities of Miamisburg and Dayton, excluding that portion of the City of Dayton bounded by Patterson Rd., Spaulding Rd., Woodbine Ave., and Smithville Rd.		x		

(continued)

TABLE 2-9 (continued)

Designated area	Attainment	Nonattainment		
		Primary	Secondary	Unclassified
Montgomery County (continued)				
Subarea south and east of the following: Rt. 440 (U.S. 40) at the Montgomery-Miami County Line, south to Bridgewater Rd., south to Taylorsville Rd., west to Little York Rd., west to Peters Rd., south to Frederick Rd., southwest to Dog Leg Rd., southwest to Westbrook Rd., west to Olive Rd., south to Shiloh Springs Rd., west to Union Rd., south to Little Richmond Rd., west to Snyder Rd., south to Old Dayton Rd., west to Luthers Church Rd., south to Mile Rd., west to Guntle Rd., south to Havermale Rd., west to Clayton Rd., south to Chicken Briskle Rd., west to Montgomery-Preble County Line; however, there is an attainment area described by the following boundaries: north on S.R. 48 from the Montgomery-Warren County Line to Whipp Rd, east to Bigger Rd., north to Wilmington Pike, northwest to Woodman Dr., north to Vale Dr., east to County Line Rd., north to Patterson Rd., west to Spaulding Rd., north to Woodbine Ave., west to Smithville Rd., south to Dorothy Ln., west to South Dixie Dr., southwest to I-75, south to the Montgomery-Warren County Line			x	
Remainder of Montgomery County	x			
Preble County				
Subarea southwest of the line described by: the Montgomery-Preble County Line Rd. at Spitler Rd., south to Kinsey Rd., west to S.R. 503, south to the Preble-Butler County Line			x	
Remainder of Preble County	x			
Warren County	x[a]			

[a] Verified by the Ohio Environmental Protection Agency to L. Gibbs, PEDCo Environmental, on June 17, 1980.

TABLE 2-10. SULFUR DIOXIDE ATTAINMENT STATUS OF OHIO COUNTIES

Designated Area	Attainment	Nonattainment	Unclassified
Butler County	x		
Clermont County Pierce Township		x	
Remainder of Clermont County	x		
Greene County Bath Township		x	
Remainder of Greene County	x		
Hamilton County Whitewater Township		x	
Remainder of Hamilton County	x		
Miami County	x		
Montgomery County Subarea southeast of the following line: Rt. 4 northeast to Union Rd., north on Union Rd. to Rt. 70, east on Rt. 70 to county boundary		x	
Remainder of Montgomery County	x		
Preble County	x		
Warren County	x		

TABLE 2-11. OZONE ATTAINMENT STATUS OF OHIO COUNTIES

Designated area	Attainment	Nonattainment	Unclassified
Butler County		x	
Clermont County		x	
Greene County		x	
Hamilton County		x	
Miami County		x	
Montgomery County		x	
Preble County		x	
Warren County		x	

TABLE 2-12. NITROGEN DIOXIDE ATTAINMENT STATUS OF OHIO COUNTIES

Designated area	Attainment	Nonattainment	Unclassified
Butler County			x
Clermont County			x
Greene County			x
Hamilton County			x
Miami County			x
Montgomery County			x
Preble County			x
Warren County			x

SECTION 3

PLANNING PROCESS FOR SIP REVISIONS AND PREVENTION OF SIGNIFICANT DETERIORATION (PSD) PROVISIONS

Section 110 of the Clean Air Act (CAA) requires each state to hold public hearings on, adopt, and submit to the Administrator a State Implementation Plan (SIP). The SIP must provide (1) for the attainment of primary NAAQS as expeditiously as practicable, but in no case later than 3 years from the date of approval of the plan, and (2) for the attainment of the secondary standards within a reasonable time. Once a state plan is submitted, the Administrator is required to approve it if it is consistent with the statutory requirements. If the plan is inadequate or if no plan is submitted, the Administrator is then required to propose and promulgate a plan for the state.

When the SIP's submitted in 1972 were being developed, the general policy was that NAAQS must be attained immediately and that overkill (stringent regulations) would not have a negative impact upon the economy. Control strategies were developed based upon the need to attain air quality standards in the most badly polluted areas. These very stringent control strategies were then applied on a statewide basis. Many problems resulted because agencies responsible for air quality planning lacked both technical experience and familiarity with the SIP planning process.

Some of the regulations promulgated were not enforceable, and monitoring test methods and averaging times were not specified. These problems were either corrected in latter revisions or solved through litigation.

The Energy Supply and Environmental Coordination Act (ESECA) passed in 1974 directed the states to revise emission regulations to avoid any overkill. Each state was required to put together a plan describing regulations that the state believed were too stringent.

In December 1974, the EPA Administrator promulgated final regulations requiring each state to amend its SIP to include a PSD (Prevention of Significant Deterioration) requirement. The intent of this program was to protect clean air areas, which are already meeting air quality standards, from polluting emissions by new and expanding utility and industrial plants. Under this program, clean air areas were divided into three classes: Class 1, in which very little air-quality deterioration would be allowed; Class 2, in which only moderate air-quality deterioration would be allowed; and Class 3, in which more significant deterioration would be allowed (as long as ambient standards were not exceeded). Congress designated large national parks and wilderness areas as Class 1. All other lands were Class 2, unless redesignated either Class 1 or Class 3 by a State Governor.

The PSD regulations were delegated to each of the regional offices for implementation. Implementation by the regional offices began early in 1975. Each of the states in the Ohio

River Valley study region has recently received delegation from the EPA regional offices to implement a PSD program. Indiana, Kentucky, and Ohio have not developed an individual program, but rely on the federally promulgated PSD regulations. The PSD planning is not discussed in great detail in the following sections because of the recent delegation and lack of individual state plans that differ from the federally promulgated plan. The existing plan is extremely complex and open to a great deal of interpretation. The EPA regional offices plan to provide extensive guidance to the states for planning and implementing PSD permitting procedures. A spokesperson for one of the EPA regional offices expressed a concern that a serious problem may develop after final promulgation of the Federal PSD regulations. It is possible that states with approved SIP's will be in effect enforcing the old federally promulgated PSD regulation, while states that have not received approval for their SIP will be implementing and enforcing the new federally promulgated PSD regulations.

In 1976, the EPA Administrator, after realizing the goals of the CAA were not being achieved, notified each state's Governor that there were deficiencies in the state's SIP. Congress became quite concerned because the NAAQS had not been attained within the specified time periods and therefore enacted the Clean Air Act Amendments of 1977. These amendments took away some of the planning powers from the regional, state, and local agencies and distributed this power to the courts and regional planning authorities (i.e., municipal planning organizations, MPO's).

One EPA regional office has expressed concern over the complexity of the CAA and SIP planning process. This complexity has outstepped the regional office's ability to keep up. The CAA demands levels of analysis that go beyond the tools available and the staff's ability. State and local authorities feel that EPA has failed to prioritize programs properly, and as a result the current approach places additional burdens by adding a continuing layer of procedural requirements. Changes in policy and requirements by the EPA cause frustration for industry and local, state, and regional offices. This regional office feels it acts as a buffer between EPA's central offices and the state and local agencies. The regional office often finds itself in difficult situations because of advice given prior to changes in policy and requirements. Instead of moving toward simplicity, the EPA has created a very complex SIP/PSD process. This complexity often makes it easy for industry to find loopholes. The regional office feels Washington needs to strike more of a balance and proper prioritization in its program.

3.1 INVOLVEMENT OF INSTITUTIONS AND AGENCIES

Three levels of government are involved in the SIP planning process. The regional EPA has the final say in approving or disapproving the SIP; the state regulatory agency has the overall responsibility of preparing and submitting the implementation plan; and local regulatory agencies have been delegated responsibility for the preparation of specific portions of the SIP's.

Not all areas within this study region are under the jurisdiction of a local regulatory agency; in these cases the state regulatory agency has the sole responsibility for preparing the SIP. Technical guidance and policy are developed not only at the state and EPA regional level but also at U.S. EPA headquarters (Washington and Durham offices).

Most of these agencies have received minimal assistance from outside the framework described above. One example of such assistance is the relationship between the State Department of Transportation (DOT) and the local municipal planning organization (MPO). Although the state DOT has no direct input into the planning process, they do exchange data bases with the MPO's and occasionally provide funding for activities of the MPO's. Also, most of the states have set up advisory groups to review provisions of the SIP's prior to the holding of public hearings required by the CAA before final submission of an SIP to the EPA.

Many of the agencies involved in the SIP planning process dealt with the same issues and problems. For instance, most agencies agreed that it was impossible to meet the time constraints set for the development of the implementation plan and still maintain the SIP's accuracy. When it became evident that some states would not complete their SIP's on time, the EPA relaxed the requirements on guidelines and policy procedures so that states could achieve SIP's before the due date. This penalized those states who worked diligently at the onset to complete the SIP. Most agencies agreed that these problems

negatively impacted the quality and integrity of their implementation plan.

The dual procedural requirements that result in a duplication of effort were another problem voiced at both the EPA regional and state levels. The state is required to propose the SIP regulations, conduct public hearings on these regulations, respond to the comments, and finally promulgate the regulations. The SIP is then submitted to the regional EPA for review. Once the EPA regional office has completed the reviewing process, any revisions that are required to obtain final approval by the EPA must go through the same procedural steps in order to obtain approval of the SIP.

One state complained of the lack of interstate cooperation in the SIP planning process. There is minimal exchange of information and data across state boundaries. This lack of reciprocity also impairs the quality of each state's SIP.

Local agencies in two out of the three metropolitan area's have experienced difficulties in defining the roles of the MPO's and the regulatory agencies in the SIP planning process. Section 121 of the CAA entitled "Consultation" requires the state to provide a satisfactory process of consultation with general purpose local governments, designated organizations of elected officials of local governments, and any Federal land manager having authority over Federal land to which the state plan applies. Problems have arisen because of differences in interpretation of this section. It has been suggested that the term

consultation regarding the MPO's activities in the SIP planning process be more clearly defined.

3.1.1 Butler County

In Butler County, the air quality planning process is administered by four agencies and institutions. Region V of EPA supplies technical guidance to the state and local regulatory agencies and reviews the SIP to ensure it is complete and accurate. The OEPA has overall responsibility for preparation and submittal of the SIP. Emissions inventories and control techniques for stationary sources were supplied to OEPA by the Hamilton County-Southwestern Ohio Air Pollution Control District. The state agency formally delegated responsibility for the transportation-related segment of the SIP to the Ohio, Kentucky, Indiana Regional Council of Governments (OKI). The role of OKI's is further explained in the next section.

Other agencies such as the Ohio Department of Transportation, the Ohio Department of Natural Resources, and the U.S. Department of Energy did not actively participate in the SIP planning process. There was very little, if any, exchange of data between these agencies.

3.1.2 Cincinnati Metropolitan Area

Two regions, three state agencies, one local agency, and one municipal planning organization were involved in preparing the elements of the SIP's for the Cincinnati metropolitan area. Although the seven counties (Hamilton, Warren, Clermont, Boone, Kenton, Campbell, and Dearborn) in this area share air pollution

problems, the Ohio River and three State boundaries divide the planning authority for addressing these problems between three States and two autonomous regions of the U.S. EPA. Indiana, Ohio, and EPA Region V in Chicago administer air quality planning programs on the northern side of the Ohio River; the Commonwealth of Kentucky and EPA Region IV in Atlanta administer programs on the southern side of the river.

The two EPA regional offices have the responsibility for providing guidance to the state and local agencies and reviewing the SIP to ensure it meets the goals of the CAA. Each element of the SIP is reviewed as it is submitted by the state.

The Air Pollution Control Division of the Indiana State Board of Health is entirely responsible for developing Dearborn County's SIP. Prior to submitting any SIP portions to Region V, the State agency must receive approval for the SIP from their Air Pollution Control Board. Dearborn County was exempted from developing an ozone control strategy because of its attainment status for that pollutant. Therefore, Dearborn County was not included in OKI's transportation related air quality planning process.

The OEPA has overall responsibility for preparation and submittal of the SIP for Hamilton, Warren, and Clermont Counties. The OPEA developed the TSP and SO_2 portions of the SIP. The Hamilton County-Southwestern Ohio Air Pollution Control Agency (APCA) (formerly the Cincinnati Division of Air Pollution Control) was undergoing reorganization during the SIP planning process.

This caused the local agency to limit its input into the TSP and SO_2 portions of the SIP. The local agency, however, provided the emissions inventory and control techniques for sources in this area, prepared the hydrocarbon (HC) portion of the SIP, and participated in the preparation of SIP revision for photochemical oxidants.

The local agency's reorganization began in early 1979 when the city of Cincinnati indicated that it would stop funding the Division of Air Pollution Control. The city felt services provided by the agency were of a regional nature and should be funded at the county level. Political rivalry and general mistrust exist between the city of Cincinnati and Hamilton County. Considerable effort was required to induce Hamilton, Butler, Clermont, and Warren Counties to accept the funding responsibilities for a local regulatory agency. The OKI, Chamber of Commerce, Tristate Air Committee, and an Ad Hoc Citizen's Committee helped to persuade the counties. The city of Cincinnati provided a major portion of the funding of the APCD for the first 6 months of 1979 and the four county governments have contributed the major local funding since that time.

In mid-1978 OKI was designated by the States of Ohio and Kentucky as lead agency for the transportation-related portion of the ozone SIP. The OKI's designation covered seven counties: Butler, Warren, Clermont, Hamilton, Boone, Kenton, and Campbell. All together, four agencies were involved in developing the ozone SIP. These agencies signed a Memorandum of Understanding early

in the planning process to specify areas of responsibility for developing elements of the SIP.

Basically, OKI was responsible for estimating mobile emissions and determining strategies to control the impacts of transportation sources on air quality, ensuring public participation in the planning process, and coordinating the plan's development. Cincinnati's Division of Air Pollution Control was responsible for estimating emissions and developing control strategies for stationary sources for Butler, Warren, Clermont, and Hamilton Counties. The Ohio Environmental Protection Agency was responsible for setting allowable emission levels for stationary sources and for developing a statewide auto emission inspection and maintenance (I/M) program. The Kentucky Department of Natural Resources and Environmental Protection (KDNREP) was responsible for all aspects of the plan related to stationary source control in Boone, Kenton, and Campbell Counties, and for studying alternative strategies for developing an auto I/M program in Kentucky.

KDNREP had overall responsibilities for developing all aspects of the Northern Kentucky SIP with the exception of the transportation-related ozone segment. This three-county area does not have a local regulatory agency. The work elements for these SIP were reviewed by several advisory groups prior to the conducting of public hearings and submitted of the SIP to the EPA.

A slight administrative misunderstanding developed between Cincinnati's Division of Air Pollution Control and OKI. Both

agencies requested to be designated as lead agency for the ozone SIP. A potential conflict was avoided by drawing up the Memorandum of Understanding, which clearly defined the roles of each of these agencies.

Outside agencies such as each state's Department of Transportation, the U.S. Department of Energy, and the state's Department of Natural Resources had minimal participation in the SIP planning process.

3.1.3 Dayton Metropolitan Area

The air quality planning process is administered by five agencies and institutions in the Dayton Metropolitan area. Region V of EPA reviews all SIP elements submitted by the state and provides technical guidance. The OEPA has overall responsibilities in preparing and submitting the SIP for the counties located in this study area (Miami, Montgomery, Greene, and Preble Counties). The Regional Air Pollution Control Agency (RAPCA) basically acted as a reviewing board for the Dayton SIP; however, they did provide background data and emissions inventory to OEPA. They also provided assistance to OEPA on the oxidant stationary source section and to the two MPO's on the mobile source segment.

This area is unique in that two MPO's were involved in planning for the hydrocarbon and ozone SIP. The six-county nonattainment region of Clark, Darke, Greene, Miami, Montgomery, and Preble Counties (Clark and Darke Counties are not considered part of the Dayton Metropolitan Area) is under the jurisdiction of the Regional Air Pollution Control Agency (RAPCA). Five of the

counties (all except Clark) fall within the jurisdiction of the Miami Valley Regional Planning Commission (MVRPC). Montgomery and Greene Counties are served by the Montgomery-Greene Transportation Coordinating Committee (MGTCC). These three local agencies and institutions and the OEPA signed a Memorandum of Agreement to define specific areas of responsibility.

The OEPA prepared plan elements relating to programs for the inspection and maintenance of motor vehicles and the retrofit of heavy-duty motor vehicles for implementation by the state agency. The OEPA was also involved in preparing plan elements relating to the control of air pollution emissions from point and area sources for implementation by RAPCA. The MVRPC was designated as the agency responsible for preparing the hydrocarbon and ozone implementation plan for the study area and submitting this plan to OEPA. The MVRPC had the additional responsibility of coordinating the planning process for all agencies involved. The MGTCC prepared transportation control measures for counties within their jurisdiction and assisted MVRPC in other elements of the transportation-related ozone SIP. The RAPCA assisted by conducting the ozone modeling studies for MVRPC and by providing background data and assistance on stationary source emissions and control techniques to OEPA.

Although the role of each of these agencies was defined in the Memorandum of Agreement, there still remained a bit of confusion in integrating the activities of each group. Communication difficulties developed between the MPO's and RAPCA. Although

this problem did not get out of hand, problems had to be resolved at the administrative level rather than at the staff level.

3.1.4 Louisville Metropolitan Area

Two regions, two state agencies, one local regulatory agency, and one municipal planning organization were involved in preparing the SIP work elements for the Louisville Metropolitan Area. Five counties (Floyd, Clark, Bullitt, Jefferson, and Oldham) in this area share air pollution problems; however, the Ohio River divides the planning authority for addressing these problems between two states and two regions of the U.S. EPA. Indiana and EPA Region V administer air quality planning programs on the northern side of the Ohio River; the Commonwealth of Kentucky and EPA Region IV administer programs on the southern side of the river.

The two EPA regional offices have the responsibility for providing guidance to the state and local agencies, and reviewing the SIP to ensure it meets the goals of CAA.

The Air Pollution Control Division of the Indiana State Board of Health has overall responsibility for preparing and submitting the SIP's for Clark and Floyd Counties. Indiana and Kentucky had originally agreed to share resources in preparing the SO_2 and TSP SIP's. The agreement was that the Jefferson County APCD would prepare these SIP work elements for Floyd and Clark counties and Indiana would recipricate by preparing these SIP elements in the Evansville area. When a series of problems were encountered, Indiana backed away from the plan and decided

to prepare the SO_2 and TSP SIP for Floyd and Clark Counties on their own.

The Kentucky Department of Natural Resources and Environmental Protection also had overall responsibility for developing and submitting the SIP for Oldham, Jefferson, and Bullitt Counties. Oldham and Bullitt Counties do not have any local agencies; therefore, the entire SIP development was completed and submitted to Region IV by the KDNREP.

The Jefferson County APCD handled all work elements of the SIP relating to Jefferson County with the exceptions of modeling studies. This local agency also worked on an informal basis with the Kentucky Indiana Regional Planning and Development Agency (KIPDA) to prepare the ozone SIP.

The KIPDA Transportation Policy Committee (TPC), by resolution on December 8, 1977, requested designation as the lead local agency from the Commonwealth of Kentucky and the State of Indiana. The Governor of Kentucky issued a letter on February 6, 1978, designating KIPDA "as that agency responsible for planning and evaluating transportation control strategies for inclusion in the air quality implementation plan for the Kentucky portion of the Louisville metropolitan area." On March 31, 1978, the technical secretary of the Indiana Air Pollution Control Board issued a letter certifying "the Transportation Policy Committee of the KIPDA as the lead local agency responsible for preparation of transportation control measures for inclusion in the Indiana State Plan of Implementation for Air Pollution Control for Floyd and Clark counties in Indiana."

On December 8, 1977, the TPC created the Clean Air Act Subcommittee (CAAS) to perform the technical work needed to fulfill the lead local agency responsibilities. The initial meeting of the CAAS was held on March 31, 1978. At the March 31 meeting, Robert T. Offutt of the Jefferson County APCD was elected chairman and Jeffrey Wentz of the Indiana Air Pollution Control Board was elected vice chairman.

Also of importance to the integration of air quality planning into the transportation planning process is the fact that the Jefferson County Air Pollution Control District was added to the KIPDA Transportation Technical Coordinating Committee as a full voting member effective on December 8, 1977. Also, the Jefferson County APCD and the Jefferson County Planning Commission worked out a memorandum of understanding whereby the Jefferson County APCD staff would have an opportunity to review major proposed developments as to their air quality impacts prior to zoning action by the Jefferson County Planning Commission.

The CAAS Transportation Planning Committee was responsible for the analysis of the air pollution reductions from the Transporation Improvement Program (TIP) and the Transportation System Management (TSM) projects implemented since 1976. Projects planned since 1975 and scheduled to be implemented prior to 1980 and 1982 were also assessed. This committee was also responsible for evaluating, selecting, and coordinating the funding and implementation of reasonably available transportation control measures.

A few agencies and organizations assisted to some degree in the SIP planning process for this area. The State Department of Transportation provided background information to KIPDA and the Jefferson County APCD. Also, the state Environmental Quality Commission, the Board of Health, and Jefferson County Medical Association acted as advisory groups and made recommendations to the state and local agencies. In addition, the Jefferson County APCD set up a series of meetings through the Chamber of Commerce to involve industry representatives in the planning process.

3.1.5 Counties Along The Ohio River

Six counties along the Ohio River between Cincinnati and Louisville are not part of a metropolitan area. Three of these counties (Gallatin, Carroll, and Trimble) are located in Kentucky; the other three (Ohio, Switzerland, and Jefferson) are located in Indiana. None of these counties has a local regulatory agency. Therefore, the air quality planning authority is divided between the EPA regional offices and state regulatory agencies.

In the Kentucky Counties, EPA Region IV provided technical guidance to the State and reviewed each SIP work element as it was submitted. The Department of Natural Resources and Environmental Protection had overall responsibility for all aspects relating to the development of the implementation plan.

The air quality planning process for the counties located in Indiana is shared by EPA Region V and the Air Pollution Control Division of the Indiana State Board of Health. Region V of EPA

reviews the SIP elements as they are submitted and provides technical guidance and policy to the State. The State agency has been charged with preparing all aspects of the SIP for these counties and submitting this plan to the region.

3.2 INTERGOVERNMENTAL CONSULTATION

Consultation among the various levels of government involved in administrating air quality planning is absolutely necessary to complete the SIP planning process and eventually obtain the goals of the CAA. Policy and guidance are developed at both EPA headquarters and the regional offices. Besides providing technical guidance and direction to the state and appropriate air pollution control agencies, the Federal EPA also issues reports on air quality criteria and control techniques providing the state and local agencies with the most up-to-date information and data available. Although this may not appear to be a complex process, lines of communication are often not as open as they could be. This is especially true when consultation must cross political jurisdictions.

Air pollution tends to be a regional problem. Cooperation and joint action, which seldom occur across state lines among government agencies, are a laudable objective, yet essential to regional problem solving. States, counties, and cities have different governmental philosophies, different goals, resources, and problems, different politics, and a whole host of differences

that lessen the potential for genuine cooperation and joint action. Only when compelling circumstances provide the necessary motivation to unite diverse interests can interstate governmental mechanisms be advanced to attack these regional problems.

Congress recognized these problems to some degree. They noted in the CAA that the predominant part of the Nation's population is located in rapidly expanding metropolitan and other urban areas that generally cross the boundary lines of local jurisdictions and often extend into two or more states. The EPA Administrator has been mandated by Congress to encourage cooperative activities by the states and local governments for the prevention and control of air pollution; to encourage the enactment of improved and uniform state and local laws relating to the prevention and control of air pollution; and to encourage the making of agreements and compacts between states for the prevention and control of air pollution.

The EPA Administrator encouraged the state to examine each of these points. A series of seminars were held in the Cincinnati Metropolitan area to analyze alternative interstate governmental mechanisms. These seminars consisted of members of the Indiana, Kentucky, and Ohio State legislators; State air pollution control boards; city officials; and concerned citizens. Results from these seminars were used as a model for other interstate metropolitan regions. These seminars could not be repeated because of a limited timeframe; however, meetings were held with appropriate state and local agencies in the Louisville

metropolitan area. At the Cincinnati seminars, it was determined that individual state programs would be maintained with a willingness to cooperate with other states provided this cooperation did not dilute state responsibility. This cooperation was further defined as the exchange of data and information through the Air Pollution Control Committee, which meets at OKI offices in Cincinnati and the Jefferson County APCD office in Louisville.

Although a mechanism was developed to exchange information, one state complained that in actuality there is minimal exchange of information and data across state boundaries. State and local jurisdictions require more than encouragement to set up interstate mechanisms that are capable of effectively handling regional air pollution problems.

Communication problems also developed in other areas of the SIP planning process. Agencies at every governmental level who participated in the SIP development complained of delayed technical guidance or of EPA's constantly changing policy and direction. This caused a great deal of frustration for most agencies and even resulted in some key staff members leaving their jobs. Also, verbal communication received from the EPA was often conflicting and confusing. Some believe that these problems partially stem from policy decisions being made at low adminstrative levels within the EPA.

3.3 PUBLIC PARTICIPATION

Section 121 of the CAA requires each state to provide the opportunity for public participation in the development of regulations and revisions of the State Implementation Plan. Generally this opportunity for public input (industry inclusive) is in the form of public meetings with industry representatives, public interest groups, and elected officials. The states within the study region generally place the most emphasis on the public hearing process. Each state goes through the same basic procedure. Prior to the public hearing, the state prepares a draft implementation plan and then follows these steps:

- Notification is published (at least 30 days prior) in the newspaper of largest circulation in each affected AQCR hearing. A copy of the proposed plan is then made available for public review at a central location within each affected AQCR.
- In the case of major revisions, the plan is submitted to the state A-95 Clearinghouse for review by appropriate agencies. This is done concurrently with the public review process and prior to the hearing.
- A public hearing is held as scheduled to accept both written and oral testimony. Time permitting, the record is left open, generally for a period of from 10 to 30 days, to allow for submittal of additional written testimony.
- Modifications are made as appropriate, taking into consideration the public hearing testimony, and the SIP revision is submitted by the Secretary of the Department of the U.S. EPA for approval. Copies of the SIP, as revised, are then printed, distributed to previous purchasers of the SIP, and made available to the general public for a fee.

3.3.1 Programs to Inform the Public About the SIP Process

The major metropolitan areas of Cincinnati, Dayton, and Louisville have their own metropolitan planning organization (MPO's).

These MPO's have greatly expanded the opportunity for public participation through their committee structure, workshops, newspaper articles, and printed literature. The Ohio-Kentucky-Indiana Regional Council of Governments (OKI) organized the Air Quality Advisory Task Force to provide policy guidance to the agencies developing the metropolitan Cincinnati transportation-related implementation plan. This committee was composed of locally elected officials, public interest groups, and industry representatives. Public consultation was extended beyond the task force to involve the public at large through a series of nine public meetings held in southern Ohio and northern Kentucky. The goal of these meetings was to provide a mechanism that allowed the public to incorporate their ideas and opinions into the final plan. Also, OKI initiated the Citizen Participation Subcommittee on Air Quality to advise and assist OKI in setting up a program to educate the general public. The goal of this program was to inform the public about the region's air pollution problems and the strategies considered to correct them. The OKI and the Citizen Participation Subcommittee decided to use in-house publications (RegioNews), newspaper articles, radio broadcasts, slide shows, and displays to obtain their goal of public education.

The Miami Valley Regional Planning Commission, Montgomery-Greene Transportation Coordinating Committee, and RAPCA shared the responsibilities in developing the transportation-related portion of the implementation plan for the Dayton Metropolitan

area. At the outset of the planning process, both the public and locally elected officials were involved through the Steering Committee on Air Quality Compliance. This committee was made up of 13 locally elected officials; representation was based primarily on population, and only the 13 elected officials had voting privileges. Provision was made, however, for representatives of the local planning agencies, state and Federal agencies, and public and private interest groups to be represented on the committee and to participate in its deliberations. The primary objectives of the Steering Committee was to educate the public through slide presentations, media coverage, lectures, etc., and to provide policy guidance to the planning agencies.

The Kentucky-Indiana Planning and Development Agency (KIPDA) was responsible for insuring public participation in that part of the State Implementation Plans dealing with transportation-related pollutants in the metropolitan Louisville area. The Clean Air Act Subcommittee (CAAS) that developed the transportation portion of the State Implementation plans for KIPDA had representation from 11 different local and state agencies and the Louisville Area Chamber of Commerce. Three public meetings were held to explain the Clean Air Act Amendments of 1977 and to solicit public involvement in the planning process.

3.3.2 Impact of Public Response Upon the SIP Process

Indiana, Kentucky, and Ohio received hundreds of public comments on their revised regulations and draft implementation plans. Summarizing all of these comments would constitute several

volumes of a report and therefore is not feasible. It is important to note, however, that the state agencies seriously take into consideration the comments received, and when feasible change portions of their implementation plan to reflect these comments. Many of the comments received contained general discussions on proposed regulations relating to policy matter or approach. For instance, 33 industry representatives, organizations, and citizens submitted similar comments on the lack of a bubble policy in the Kentucky SIP. They felt the State should adopt the so-called bubble concept to allow sources maximum flexibility in determining the specific emission points to be controlled. Owing to the large number of favorable comments received by Kentucky's Department of Natural Resources and Environmental Protection, affirmative action was taken to provide this alternative reduction option in the regulations. The bubble concept is now contained in 40 KAR 50:0055 Section 6 of the regulations. This new regulation is in accordance with the proposed policy statement by the U.S. EPA, 44 F.R. 3740-3744 dated January 18, 1980.

States often receive comments asking them to omit or delete regulations and requirements that they are forced to include by law. For example, one industry representative felt Kentucky should not promulgate PSD regulations until current litigation surrounding the Federal PSD regulation is concluded. Since Kentucky can neither be more nor less stringent than EPA, adoption of a State regulation prior to the conclusion of Federal litigation

is likely to create serious legal problems. The State responded that the CAA and subsequent Federal regulations require the State to adopt PSD regulations by July 1, 1979. These regulations are required to be as stringent as the Federal regulations, but State statutes forbid the State PSD regulations from being more stringent than the Federal regulations.

The proposed inspection and maintenance (I/M) programs have also attracted a considerable amount of public attention. The state legislators have failed to pass any legislation authorizing an enforceable I/M program. As such, the legislators have "passed the buck" for enforcement of I/M down to the local politicians. Louisville is in the process of passing an ordinance for an inspection and maintenance program that will be tied into a sticker system enforced by the local police (similar to Cincinnati's present I/M program). Several public comments were received during the first reading of Louisville's I/M ordinance. Louisville citizens were concerned over the following:

- Indiana residents who work and shop in Louisville will not have to participate in the I/M program.
- Cars over a certain age will not be included in the program.
- The public will be required to spend only $100.00 to correct the problem. Once $100.00 is spent, the public is not required to do anything else.
- The program will place a financial burden on the public.
- The fine for noncompliance will be the same as that for failure to submit the vehicle for inspection.

During a second reading, an amendment to this ordinance was made to include those automobiles whose owners live in Indiana, but work in Louisville. Other local jurisdictions within major metropolitan areas are following Louisville's lead in order to avoid sanctions threatened by the U.S. EPA.

3.3.3 Comments Received From Members of the Information Group

In order to provide an opportunity for comment on the SIP/PSD planning process, the National Commission on Air Quality established an Information Group. The Information Group consisted of representatives of state and local regulatory agencies, metropolitan planning agencies, industry, environmental action organization, League of Women Voters, and other public interest groups. Comments regarding the SIP/PSD planning implementation and enforcement process were solicited from all members of the information group. In all, more than 80 individuals were contacted either in person or by telephone. Specific comments that represent the concern of the various areas of interest encompassed by the environmental and industry members of the information group are summarized below.

Members of the Information Group generally agreed that efforts were made to acquaint the public with the issues involved in the SIP planning process. The MPO's in particular took a very active role in acquainting the public with the issues and informing them with the various steps involved in the preparation of the SIP. In retrospect, it is obvious that the general public did not take advantage of the opportunities for involvement and

comment that were afforded them. The issues involved in SIP planning are of a highly technical nature. There is no sufficient motivation on the part of the general public to study and hence understand the issues. Even some of the members of the environmental action groups expressed their concern about not being able to thoroughly understand some of the complex technical aspects of the SIP.

Industrial interests regarding SIP planning are well served. Large corporation have qualified professionals who study the issues and prepare formal written comments regarding even the most minute details of the SIP. Such individuals are knowledgeable in the application of control technology and the use of mathematical modeling to assess air quality impact.

Members of the Information Group expressed interest in a two-stage public review process that would provide an opportunity for the public to participate without the fear of intimidation by the technical aspect of the various issues. It was suggested that one hearing be held for general public comments and another be held for technical comments.

Comments received from individuals representing environmental groups questioned whether or not the national ambient air quality standards are sufficient to protect public health. Many felt that time constraints were a major problem in obtaining the goals of the CAA and adequately preparing these latest SIP revisions. One individual representing the environmental viewpoint stressed that time constraints are an absolute necessity to

pressure industry into prompt compliance with emission regulations. Environmentalists had a strong belief that the philosophy of negotiation rather than enforcement, as evidenced by the State of Ohio and even by the Federal EPA, was a major factor in the failure of the 1972 SIP to meet the goals of the CAA. This viewpoint expressed by some environmental representatives was supported by data that showed that out of a total of 400 noncomplying sources in Region V, 204 of these noncomplying sources are located in the State of Ohio.

Some of the environmentalists expressed concern that the Ohio River Valley region has been subjected to unwarranted expansions by electrical utilities. According to one of the environmental representatives, the average population growth in this area has been only 25 percent of the national average, yet the utilities have used inflated growth projections, without taking into consideration changing population figures or the impact of conservation by consumers. The average nationwide operating capacity for utilities exceeds the peak operating rate by 43 percent. One utility system in our study area has a total reserve peak of 53 percent. The utilities apparently receive a substantial tax credit on present earnings for construction at new facilities. Air pollution generated by power plants has become a "hot" issue among the public sector because of the two Section 126 Actions currently being resolved. Section 4 discusses these two interstate disputes in great length.

Monitoring vs. modeling is an issue brought up by both environmentalists and industry representatives. Both factions agree that modeling is an infant science attempting to play an adult role. Nobody can agree, however, on how much emphasis should be placed on modeling during the decision making process. Many industrial representatives believe that more emphasis should be placed on monitoring (actual data generation) rather than modeling, because modeling assumes the worst-case situation. One industry representative was concerned that monitoring data can be easily biased because of poor site selection and other variables. Everyone contacted in the information group felt that both of these techniques need a great deal of refinement.

Another issue raised by many environmental and industry groups centered around regional inconsistencies. These inconsistencies have surfaced in both regulations and applications of various modeling techniques. The decentralized makeup of the U.S. EPA allows each regional office a great deal of flexability in policy and guidance. This often results in differences in their regulations and modeling techniques. It should be mentioned that the EPA regional offices are attempting to deal with some of these problems. Regional differences in the application of modeling techniques are being resolved by the issuance of a new guidance document and by attempts to establish a clearinghouse for the various models.

Information group representatives in the Louisville area expressed concern over fears that nonattainment areas in the

study region will not reach attainment by 1982. This could cause the general public to become frustrated with the entire planning process.

According to many industry representatives, the 1972 SIP failed to meet the goals of the CAA because of finite time constraints (which appeared again in the 1979 SIP revisions) and failure to establish a proper basis for emission standards. Because of these finite time constraints, the original SIP ended up with too much uncertainty and too many mistakes. Emission standards were based on worst-case situations. The most seriously degradated areas were selected for worst-case modeling to establish statewide standards. Extensive litigation was required to obtain revisions to these standards. Eventually, these standards were revised to reflect the actual local situation.

Several industry representatives believe that most of the states in the study region use court litigation as a major tool for enforcement. The control agency's attitude of "see you in court" ends up in an expensive, long drawnout procedure. Many of the industrial representatives believe that it would be more effective to use negotiation as an enforcement tool.

Industry appears to be worried that the PSD regulations will inhibit industrial growth. Industries such as those oriented to consumer products are more sensitive to these inhibiting factors. The problem centers around delays in new source construction of up to 2 to 3 years. These delays are caused by requirements to set up and conduct extensive monitoring prior to receipt of a permit for construction. Industry representatives have also

expressed concern centering around the establishments of increment consumption and banking systems.

3.4 TECHNICAL, LEGAL, AND ADMINISTRATIVE ISSUES

The complexity of the SIP/PSD planning and permitting process and the various approaches that could be implemented to achieve the goals of the CAA assure that many issues will be raised. This has been the case since the first SIP was developed and has continued through the latest SIP revisions. Issues raised on technical, legal, and administrative problems are described in the following subsections.

3.4.1 Technical Issues

Many unknowns still exist in the science of air pollution control. Techniques used to monitor and model pollutants in the ambient air still require a great deal of refinement. Issues are bound to be raised when these tools are applied to the decision-making process in developing air pollution control strategies.

Designation of Nonattainment Areas--

Section 107(d) of the CAA required that states submit to the Administrator of the EPA a list, together with technical support documentation, identifying those air quality control regions or portions thereof which, as of August 7, 1977:

- Do not meet a national primary air quality standard
- Do not meet a national secondary air quality standard

- Cannot be classified on the basis of available data or are better than any national primary or secondary standard

Guidance in the designation of attainment status published in the Federal Register (March 3, 1978) directed states to "consider the most recent four quarters of monitored ambient air quality data available." If sufficient data were lacking, other evaluation methods "including air quality dispersion modeling" were to be used. Further, the Federal Register notice required a designation of nonattainment for photochemical oxidants for all urban areas with a population over 200,000, with the exception of Honolulu, Hawaii, and Spokane, Washington.

Areas in the States of Indiana and Ohio that had been classified as attainment for sulfur dioxide on the basis of air quality monitoring data were reclassified by the EPA as nonattainment. The EPA based its designation of nonattainment upon the use of meteorological dispersion modeling. The state regulatory agencies and industrial groups were especially concerned with the validity of the Real-Time Air Quality Simulation Model (RAM).[1] Application of RAM was upheld by the U.S. Court of Appeals for the Sixth Circuit in the case of Cleveland Electric Eliminating Company, et al., versus EPA, No. 76-2090.

Consistency in the Application of Models--

Models of various types were used in the development of control strategies as a part of the recent SIP revisions. Techniques for modeling photochemical oxidants include the EKMA[2] and Linear Rollback[3] models. For total suspended particulates

the Modified CDM[4] and AQDM[5] models were used. Finally for sulfur dioxide the CRSTER[6] and RAM[1] models were used. In general the choice of modeling technique was determined by the availability of adequate data bases and the resources required to apply a model. Each control agency supported its choice of modeling technique.

In the Cincinnati area, the control strategy for photochemical oxidants was based upon the EKMA model that used a ratio of hydrocarbon to oxides of nitrogen based upon locally available air quality data. In the Louisville area, Linear Rollback was used. Justification for using Linear Rollback rather than the EKMA model was based upon a lack of air quality data from which to determine the city-specific ratio of hydrocarbon to oxides of nitrogen. The extent to which this difference in modeling techniques will affect the attainment of the national ambient air quality standard has not been determined.

Many people developing the ozone control strategies feel that the EKMA model is superior to the Linear Rollback method. One local control agency felt that their jurisdiction had an adequate data base to use EKMA, but they were required to use the Linear Rollback method by the state agency. The state environmental agency chose this modeling method because of the lower required reductions received using rollback for this jurisdiction.

3.4.2 Legal Issues

Areas designated as nonattainment for photochemical oxidants are required to include in their SIP a specific schedule for implementation of a vehicle emission control inspection and maintenance (I/M) program (Section 172(b)(11)B, CAA). The Administrator of the EPA is directed to impose sanctions against a state that fails to include an I/M implementation schedule in the SIP (Section 176(a) CAA). Such sanctions include withholding of Federal funds under the Urban Mass Transportation Act, Title 23 of the United States Code, and the Housing and Urban Development Act.

As of the date of preparation of this report, only the city of Cincinnati has an operating I/M program. Owners of vehicles that pass the emission test are required to display an inspection ticket on the front window of their vehicle. The city of Cincinnati Police Department is authorized to issue citations to owners of vehicles that do not have valid inspection tickets so displayed. Problems have arisen from this sticker system, however. Cincinnati's police force is overworked and understaffed. Enforcement tends to be minimal; therefore, many citizens have decided not to participate in the program.

The city of Louisville and Boone County, Kentucky, are in the process of passing local ordinances authorizing an I/M program similar to the program being implemented in the city of Cincinnati. It is expected that implementation of these I/M programs will result in enforcement problems unless the state

legislature passes legislation that ties the I/M program into the vehicle licensing system.

Currently the State of Indiana has legislation on the books that provides for the implementation of an I/M program. The legislation does not include a provision for adequate enforcement. The local authorities in Clark and Floyd Counties are being encouraged to pass the necessary legislation to ensure enforcement of the I/M program.

The legislative bodies of the Commonwealth of Kentucky and the State of Ohio are currently considering legislation that would provide for an enforceable I/M program. Representatives of the EPA are applying great pressure on the individual legislators to support the passage of such legislation. The threat of sanctions is being voiced by the EPA as a means of convincing legislators as to the importance of an acceptable I/M program.

Implementation of the I/M program has become a very volatile political issue. Whereas most emission regulations have a direct effect only upon industry, the I/M program will affect every owner of a vehicle within the area encompassed. It is easy to understand the reluctance on the part of a politician to support a program that will have a direct impact upon the general public.

Another legal issue impacting the review of sources and subsequent emissions limitations is the continued use of Pasquill-Gifford stability Class A dispersion coefficients for tall stacks. On the one hand these coefficients are considered

state-of-the-art in dispersion modeling and provide a tool for estimating pollutant concentrations. In the context of tall stacks, however, much experimental evidence has shown that the application of these A-stability parameters may lead to over-estimates of ground-level concentrations. The basic premise is that highly unstable conditions found on bright, hot, sunny days do not necessarily apply to the atmosphere immediately near the top of very tall stacks.

The main context for this issue was brought up at the Clifty Creek Power Plant hearings. This issue was also similar to the central issue in a litigation in the U.S. Court of Appeals for the Sixth Circuit in Cincinnati: Gas & Electric Co., V. EPA, 578 F. 2d 660[1978]. The Court found that EPA had not developed an adequate record to support the use of the Class A parameters. The EPA, however, has further investigated the use of Class A Stability with tall stacks and has demonstrated that their use is reasonable.[7] This ruling raises an issue that confronts decisionmakers, modelers, and industry, i.e., should technical questions be resolved in a court of law, by mutual technical agreement, or by an arbitrating technical group. To date, this question is still open and not resolved.

3.4.3 Administrative Issues

Two very important administrative issues that have surfaced relate to emission offset and PSD increment consumption. Offset pertains to the requirement for permit approval to demonstrate that total allowable emissions from existing and proposed new or

modified sources in the region will be sufficiently less than total emissions from existing sources allowed under the SIP so as to represent reasonable further progress toward the attainment of air quality in the region. Relative to the prevention of significant deterioration, a permit for the construction of a new or modified major source must demonstrate that emissions from the new source will: (1) not cause violations of the NAAQS in attainment areas nor exacerbate air quality in a nonattainment area, and (2) not consume more than the remaining allowable PSD increment.

With respect to emission offset, each regulatory agency needs to adopt a policy as to what constitutes "sufficiently less" emissions. Further, each agency needs to develop a procedure for tracking the banking of emission offsets in situations wherein a source reduces emissions by more than that which constitutes sufficiently less emissions. As of the date of this report, none of the regulatory agencies has formalized its policies and procedures relative to offset and offset banking.

Two issues must be addressed relative to PSD increment consumption. The first issue has to do with the portion of the remaining PSD increment that can be consumed by any given new source. The second issue concerns the need to develop a systematic way to track increment consumption so that the remaining allowable PSD increment can be determined at any point in time. Because the EPA has only recently delegated responsibility for PSD review to the state agencies, formal policies and procedures have not been developed.

Each of the state regulatory agencies evaluates PSD application on a case-by-case basis. General policy is that an applicant for a permit is allowed to consume all of the remaining allowable PSD increment. Some thought is now being given to the adoption of a policy that would allow consumption of only a specified percentage of the remaining increment.

The issue of tracking increment consumption is now in a state of confusion. To begin with, the "baseline concentration" must be determined. In the PSD regulation originally adopted by the EPA (F.R. June 19, 1978), the baseline concentration was defined as the "ambient concentration level reflecting actual air quality as of August 7, 1977 minus any contribution from major stationary sources and major modifications on which construction commenced on or after January 6, 1975." As a result of the opinions rendered by the United States Court of Appeals for the District of Columbia in Alambama Power Company v. Costle, 13 ERC 1225, the EPA has proposed to change its definition of "baseline concentration." The proposed definition was published in the Federal Register on September 5, 1979. A final rule is expected to appear in the Federal Register in the immediate future.

The revised definition of "baseline concentration" is "that ambient concentration level which exists on the date of the first complete application after August 7, 1977 minus any contribution from major stationary sources and major modifications on which construction commenced on or after January 6, 1975.

Once the baseline date has been established, it will be necessary to determine the amount of increment consumption by all sources that commenced construction on or after January 6, 1975. Determination of increment consumption by individual sources can only be done by the application of dispersion modeling. For PSD applications that have been approved to date, the determination of increment consumption by prior sources has been the responsibility of the applicant for a PSD permit. With the passage of time as many new sources are granted permits, the resources required for each new permit application will increase significantly. Regulatory agencies are seeking to find a simple and inexpensive way to track increment consumption. They are looking to the EPA for guidance.

One regional EPA office within our study area has developed a serious bookkeeping problem over the last 10 years. Many states within this region's jurisdiction have changed regulations in their implementation plans without notifying the regional office. This has resulted in the regional office enforcing one regulation while the states are enforcing another. Since this problem is shared by more than one regional office across the Nation, U.S. EPA has selected a contractor to update each state's SIP in order to remedy the situation. In the meantime, the regional EPA offices are having difficulty determining exactly which regulation to enforce. These determinations have been further muddled by a series of contradictory court opinions at the state and Federal level.

3.5 FLEXIBILITY OF PLANNING PROCESS TO MEET CHANGING REQUIREMENTS

The currently approved SIP's were developed using available and projected emission data bases and state-of-the-art modeling techniques to attain and maintain national ambient air quality within the time schedules provided in the CAA. Changing requirements relative to the assessment of health impacts, emission control technologies, legal rulings, and modeling techniques will require an evaluation of the impact of such changes and a determination as to whether or not the SIP needs to be revised. Section 110(a)(3)(A) of the CAA provides for the submission of revisions to a SIP. The Administrator is authorized to approve a revision of a SIP provided that it has met the requirements of Section 110(a)(2) of the Act and has been adopted by the state after reasonable notice and public hearing. Until such time as the Administrator approves a SIP revision, the provisions of the approved SIP must hold.

3.5.1 Assessment of Health Impacts

Section 108(a)(2) of the CAA requires that the Administrator issue air quality criteria for an air pollutant that is deemed to endanger public health and welfare. The air quality criteria must accurately reflect the latest scientific knowledge relative to the identifiable effects of a pollutant on public health and welfare. Following the issuance of air quality criteria for a pollutant, the Administrator is required to promulgate a national ambient air quality standard for that pollutant. Section 108(c)

requires that the Administrator review and reissue air quality criteria when it is deemed to be necessary.

The currently approved SIP's were developed to attain and maintain the national ambient air quality standards that had been promulgated prior to the time required for submission of the SIP. In the event that the Administrator determines that any of these standards be revised, it will be necessary to submit an SIP revision. The recent revision of the national ambient air quality standard for photochemical oxidants precipitated a revision of the SIP.

3.5.2 Energy Supplies

Control strategies contained in the SIP's are based upon the need to control projected emissions sufficiently to attain and maintain the NAAQS. For the most part, procedures used to project emissions did not take into consideration the impact upon emissions of a significant change in energy supplies and/or energy demands as a result of conservation programs. In the event of a drastic curtailment of the supply of oil from the Organization of Petroleum Exporting Countries (OPEC), there would be a wholesale switch to coal. Such a change would require a thorough evaluation of SIP regulations and would probably cause major changes in emission limitations for fuel-burning sources. On the other hand, a significant reduction in the use of gasoline-powered vehicles could provide for a relaxation of emission limitations for stationary sources of hydrocarbon emissions.

3.5.3 Legal Rulings

The impact of legal rulings on the SIP cannot be overlooked. Revisions to the PSD regulation (40 CFR 52.21) as a result of the recommendations by the Court of Appeals in the case of Alabama Power v. Castle (13 ERC 1225) are expected to be published in the Federal Register prior to the time of release of this report. Similarly, in the case of Cleveland Electric Illuminating Co., et al., v. EPA, No. 76-2090, the U.S. Court of Appeals for the Sixth Circuit rejected a petition that the use of a RAM dispersion model as the basis of the EPA plan for the control of sulfur oxides from sources in Ohio was "arbitrary and capricious;" thus, the way was paved for more widespread use of modeling in determining the air pollution impact of emissions from major sources. Either of the above decisions would have been sufficient cause to require a revision of the SIP.

3.5.4 Equitable Allocation of PSD Documents

It is almost a certainty that a battle will soon erupt over the allocation of PSD increments and the attendant restriction on growth in interstate areas. States will soon submit revisions to the SIP's to incorporate new source review under the PSD regulation. To date, the EPA has not issued any formal guidelines regarding the equitable allocation of the PSD increment. It is expected that each state will adopt a policy regarding the portion of the remaining PSD increment that any one source may consume. The lack of close coordination between the three States in the development of new source review under PSD will

most certainly precipitate petitions under Section 126 of the CAA. Any ruling by the Administrator as a result of such petitions will almost certainly require either or both of the affected States to go through a formal SIP revision.

3.6 DISPUTES OVER TECHNICAL PROCEDURES

The realtive importance of measured air quality data versus calculated air quality values using dispersion models has been a source of bitter disagreement throughout the SIP and now the PSD planning process. Representatives of industry and state and local regulatory agencies accuse the EPA of only accepting measured air quality data when such data show violations of the NAAQS. In this situations wherein measured data do not show violations, it is agreed that the EPA will accept only the results of dispersion modeling and that such modeling regularly predicts pollutant concentrations that are substantially higher than measured data for the same location. A representative of an environmental action group also criticized the indiscriminate use of modeling; he stated that "modeling is an infant science trying to perform an adult task."

In the case of Cleveland Electric Illuminating Co. v. EPA, NO. 76-2090, the petitioners questioned the EPA policy in which the designation of nonattainment was based upon modeling under the assumption that all sources are operating at their maximum permitted capacity all of the time. The petitioners argued that the probability of such an occurrence in a metropolitan area with

a number of major point sources is quite small. They agreed further that the probability that worst-case meteorology would coincide with the time when all sources were operating at their permitted capacity was even smaller. The court upheld EPA procedure, contending that each source could at any time operate up to its permitted capacity.

Another very critical issue related to modeling is the use of Class A stability dispersion coefficients. Representatives of industry, as well as the state and local regulatory agencies, object to the use of these dispersion coefficients on the grounds that actual ambient pollutants are grossly overpredicted. The use of Class A stability dispersion parameters was an issue in the Section 126 Action involving the Gallagher Steam Generating Station located in southern Indiana across the Ohio River from the city of Louisville.

Still another issue involving modeling is the applicability of so-called steady-state Gaussian dispersion models in situations with pronounced terrain features. Opponents of the use of nearly all of the currently available models argue that the assumptions regarding plume transport and dispersion do not adequately portray actual conditions.

The acceptability of modeling results is limited by the lack of adequate emission and meteorological data for use as input into models and by the lack of comprehensive air quality data to verify the application of models. The calculation of actual emissions from most sources relies on the use of emission factors

rather than acutal emission source test data. Estimates of actual emissions are usually based upon average activity levels and the vendor's specification of control device efficiency. There is no practical way to estimate actual emissions on an hourly basis for most emission sources.

The meteorological data base is also inadequate for modeling the emissions from a large number of sources in an urban area. Normally, a nearby weather observation station has the only available meteorological data for an area. This station is usually located at an airport 10 or 20 miles from the center of the area being modeled. Further, even the meteorological data provided by the official weather observer do not truly represent the conditions that existed over a 1-hour period, which is assumed to be the shortest time interval in most models.

3.7 ADEQUACY OF AVAILABLE RESOURCES AND TIME CONSTRAINTS

Generally each of the agencies at the Federal, state, and local levels has sufficient funds, manpower, and time to complete only high-priority tasks. In the present economic and political climate many of these agencies predict a constant level of funding with a decrease in staffing levels. This is partially due to present attempts to balance the governmental budget and partially to the inflationary economic spiral our country is caught in.

The regulatory agencies involved in planning and implementing the SIP will be required to expand some existing programs and implement new programs to achieve the goals of the CAA. These

expansions in agency activities must be carried out with basically the same or dwindling resources. At the same time, these agencies are required to complete the SIP planning process and implement all the programs in what they believe is an unrealistic time frame. This culminates in achieving less than what the agencies originally set out to complete.

3.7.1 Data Base Development

The development of data bases is the foundation in the decision making processes utilized during SIP planning and subsequent implementation. It is essential that these data bases are sound in order to avoid faulty decisions. Most of these data bases are outdated and often inaccurate. Improvement of these data bases has received a low-priority rating at the Federal and state levels. Staff members working on these low-priority tasks are poorly paid and receive minimal training.

Some problems with the emissions inventory systems in the study region are listed below.

- The computer program design is outdated and often varies according to state method.
- The computer software is poor; and those who run the hardware receive low salaries.
- It is very difficult to accurately estimate emissions from reentrained dust and area sources.
- Data in the system are not updated as much as could be expected.

The state agencies need to obtain adequate software and then keep the emission inventory data updated. Given the low-priority rating and the lack of funds, manpower, and time, it is doubtful that an accurate emissions inventory system will be developed.

The meteorological data base is another area in which development of up-to-date data has fallen behind. The last year that hourly meteorological data was routinely processed from weather observation records was in 1964. Since that time data for every third hour is keypunched and entered into the meteorological data base. Attempts have been made to persuade EPA and National Oceanic and Atmospheric Administration (NOAA) to routinely keypunch these data, but both agencies lack the resources necessary to complete this task. The National Weather Records Center has a large backlog of orders from regulatory agencies for meteorological data. The inability to have the proper meteorological data avaiable when needed inhibits the accuracy of modeling studies. Some meteorologists feel that if these data bases are not available prior to 1982, problems could develop if the goals of the CAA are not obtained.

Most agencies in the study area used Linear Rollback for ozone modeling. These agencies either lacked the data base, or in side-by-side calculations of rollback and EKMA, they found that rollback required less reduction. The city of Cincinnati was an exception to this rule. Ambient monitoring data for nonmethane hydrocarbons (NMHC) and nitrogen oxides (NO_x) from 1971 through the present enabled the Cincinnati area to use a city-specific NMHC/NO_x ratio (a key factor in EKMA modeling). This lowered the required HC emission reduction for the Cincinnati Metropolitan area by over 20 percent compared with that calculated using the Linear Rollback model.

3.7.2 Use of Sophisticated Modeling Techniques

Dispersion modeling has been widely used in State Implementation Plans (SIP's) to identify violations of the National Ambient Air Quality Standards (NAAQS) and in control strategy testing to aid in determining required emission limitations. One of the major drawbacks to more extensive modeling has been the lack of resources and expertise for using the most sophisticated modeling techniques. In the past 10 years much of the available resources were used to assemble emission inventories and conduct air monitoring programs, which left very little for detailed modeling. This necessitated the use of more region-wide techniques such as emissions rollback. As a result of the base case SIP's and recent research and development, dispersion modeling methodology has improved significantly (becoming both more precise and accurate), and has become more widely acceptable and available.

In more recent SIP's, specifically for the Ohio River Valley, more sophisticated modeling techniques have been used to supplement pollutant monitoring. The application and accuracy of the models, however, are still subject to the operational constraints of the whole study area. As summarized by the NCAQ Atmospheric Dispersion Modeling Panel (1980), these constraints include:

- Limitations of available time and resources
- Need for regulatory consistency
- Need for reproducible results

The adequacy of time and resources for SIP modeling in the Ohio River Valley limited model selection and application techniques. In the previous section the constraints on data base development demonstrated the practical limitations on collecting emissions and monitoring data. These limitations were a controlling factor then in applying any modeling to the region. Considering the time alloted and the resources available in each state in this study (Kentucky, Ohio, and Indiana), only standard or off-the-shelf modeling techniques were even considered. A listing of the models considered is included in Section 3.8.2.

Even though more sophisticated modeling is available, its use is not necessarily appropriate. The APRAC-2 for modeling carbon monoxide or the Urban Airshed Model for modeling ozone may certainly be the most sophisticated models to use, but in terms of the detailed emission inventories needed, their use is not practical at this time. Only areas designated for special funding and special studies have been able to implement the most data intensive models (e.g., the Northeast Corridor Regional Study for Ozone). To use a dispersion model without commensurate emissions and meteorological data, etc., subjects the accuracy and interpretation of the modeling results to severe scrutiny.

In most cases for the Ohio River Valley SIP's, models were chosen to allow fairly good agreement with available inputs and to agree with standard models. In contrast to earlier modeling in the 1972 SIP's, the techniques chosen in the 1979 SIP revisions were more detailed, more data intensive, and more useful,

especially in describing the temporal and spatial distributions of pollutants. As with most modeling studies, the level of analysis was in fairly good agreement with the level of resources and time available to perform the analysis. Some foresight on the part of the participating agencies including may lead to improved modeling and support of data bases for the 1982 SIP revisions. Even if time and resource constraints are minimized, however, regulatory consistency, result reproducibility, and sophisticated model changes may restrict the level of analysis as in the past.

3.7.3 Areas of Further Research and Necessary Study

Great studies have been made during the last 10 years in the development of sophisticated analytical tools. This has improved the quality and quantity of existing data and our general knowledge of air pollution problems. As our knowledge of air pollutant interactions improves, more problems surface that require additional research and study.

Many areas in the air quality planning process have been identified for further research and study. Some have received a high-priority rating, but many of these projects have been placed on the "back burner" until sufficient funds, manpower, and time are available.

Two large areas requiring additional study have received a high-priority rating and even national attention. Both of these study areas deal with the long-range transport of pollutants.

The long-range transport and chemical relationship of hydrocarbons, nitrogen oxides, and ozone have been studied over the last 20 years. These chemical interactions in the ambient air are extremely complex and difficult to understand. Additional research is ongoing concerning these chemical interactions, techniques to model these interactions, and control strategies. Further investigation is needed on the importance of the NMHC/NO_x ratio used in EKMA modeling of ozone. Research should also be conducted on the combined relationship of nitrogen oxides and nonmethane hydrocarbon control strategies in an ozone control plan.

The long-range transport of sulfur dioxide and it's subsequent precipitation as acid rain is an area of study that has only recently been recognized. Research of this problem has been sketchy over the last several years, but funding has been released to complete an indepth analysis of the problem. One EPA regional office is in the process of setting up an acid rain network and plans to complete a full range of organic and inorganic analyses on the samples collected. Modeling techniques are also in the process of being studied.

Hazardous pollutants in the ambient air are just beginning to come into the limelight. Accurate monitoring techniques have not been adequately developed. Some feel that this lack in development of appropriate technology is due to U.S. EPA's focus on criteria pollutants.

Improvements in dispersion modeling techniques require further research and study to eventually resolve the controversies

surrounding modeling results. The NCAQ Atmospheric Dispersion Modeling Panel (1980) described several factors that affect model accuracy: uncertainties in emission inventories, quality and reliability of meteorological data, representativeness of modeling results in characterizing complex chemical and physical processes, and application of models to situations other than those for which the models were developed. Most of the problems discussed in modeling throughout the Ohio River Valley study area revolved around these kinds of uncertainties.

The application of A-stability dispersion coefficients to tall stacks remains a point of contention among the general scientific community. This uncertainty may only be resolved by continued study of the application of surface-derived meteorology to tall stacks. Another uncertainty in the application of wind fields and stability concerns the state-of-the-art treatment of complex terrain. No standard models provide significant treatment of complex wind flow or the subsequent related dispersion of the pollutants (including the treatment of receptor elevation). Because of some of the constraints mentioned in the previous section on modeling, the use of other models that may or may not improve modeling capabilities is restricted. Thus, another point of contention currently in the initial stages of study by EPA is the establishment of performance standards to put more commonly used models on an equal footing with other available techniques.

Two other issues were discussed in several SIP's and in Environmental Impact Statements (EIS). These issues addressed

the lack of adequate consideration of the impact of large power plant plumes on long-range pollutant transport and the potential channeling effects of the Ohio River Valley corridor. Time and resource constraints limited regulatory agency investigations of a plant's contribution to long-range transport and the use of tall stacks to keep pollutants out of the Ohio corridor. These responses were specific to the proposed Trimble County (Wise's Landing) power plant.

3.7.4 Commitments from Local Jurisdictions

The state and local agencies involved in SIP planning have placed a great deal of emphasis on receiving commitments from local jurisdictions. Commitments for all components of the SIP have been received with the possible exception of commitments for an inspection and maintenance program.

The State legislators in Kentucky and Ohio have failed to pass legislation to provide statutory authority for an inspection and maintenance program. Although Indiana has I/M legislation, EPA has found it to be unacceptable. The burden of establishing an inspection and maintenance program has been placed on the local elected officials. Ordinances for an I/M program are in the process of being passed in the city of Louisville and Boone County, Kentucky. The city of Cincinnati has had an I/M program for several years. It is questionable, however, if the city will continue funding this program because their overworked police force has not been enforcing the sticker system.

3.8 DEVELOPMENT OF TECHNICAL PROCEDURES

3.8.1 Growth Projections

The development of a control strategy to attain and maintain the NAAQS for future years required the projection of emissions at specific points in future time (i.e., 1982, 1987, 1990). Whether or not the SIP's are adequate to reach the desired air quality goals is highly dependent on the extent to which actual pollutant emissions in future years reflects those that were projected.

It is not possible to make a direct projection of emissions; however, it is necessary to project an activity level. The regulatory agencies used a variety of methods to project such activity levels. Large industrial sources were contacted to obtain projected changes in productive capacity and/or raw materials used in the manufacturing process, and electric utilities were requested to project electrical demand at specified points in time. Regulatory agencies also used various indices of economic growth to supplement the growth projection information provided by the large industrial sources. These indices were taken from sources such as the growth projections developed in Section 208 of the Water Pollution Control Act, the 1972 Office of the Bureau of Economic Research Service (OBERS) Series E Projections,[8] the 1977 Bureau of Economic Analysis,[9] the 1972 Census of Manufacturers (CM),[10] the Ohio Bureau of Employment Services,[11] etc. Table 3-1 presents a summary of the type of data used by each regulatory agency and MPO.

TABLE 3-1. PRINCIPAL PROJECTION PARAMETERS USED BY AGENCIES/ORGANIZATIONS FOR DETERMINING SOURCE EMISSIONS

Agency/ organization	Stationary sources (point)	Stationary sources (area)	Mobile sources
State			
Kentucky	Future process throughput, additional onsite controls, construction, retirement of facilities[a]	Population and employment[b]	Mobile 1, VMT, vehicle mix[c]
Indiana	Future process throughput, onsite controls, OBERS projections[d]	Population and employment[d]	Mobile 1, VMT, vehicle mix[d]
Ohio	Forecasted production/operation schedules, onsite controls, RACT on existing sources[e]	Population, employment, RACT on existing sources, industry projection[f]	Mobile 1, VMT, vehicle mix[e]
Local			
Jefferson Co. APCD	Forecasted production schedules, onsite controls, RACT[g]	OBERS projections, projected VMT[g]	Mobile 1, VMT, vehicle mix
RAPCA	Production forecast, onsite controls, RACT[f]	Population, forecasted growth, predicted fuel sales[f]	
Southwestern Ohio APCD	Future production, onsite controls, RACT, OBERS projections[h]	Population, projected fuel sales, etc.[i]	

(continued)

TABLE 3-1. (continued)

Agency/ organization	Stationary sources (point)	Stationary sources (area)	Mobile sources
Municipal Planning Organization			
KIPDA	Future process weight rates, onsite controls, projected control efficiencies (RACT)[j]	Population and employment[j]	VMT, vehicle mix, socioeconomic data[j]
MVRPC			VMT, vehicle mix, socioeconomic data[k]
OKI			Mobile 1, VMT, vehicle mix, other[h]

[a] Source - Source owners and operations.

[b] Source - Federal and state planning agencies.

[c] Source - Kentucky DOT.

[d] Source - Personal communication with B. Titus, Indiana Air Pollution Control Board, July 8, 1980.

[e] Source - Personal communication with J. Orlemann and William Juris, Ohio Environmental Protection Agency, July 9, 1980.

[f] Source - Ohio SIP, Dayton AQCR, May 1979.

[g] Source - Personal communication with M. DeBusschere, Jefferson County Air Pollution Control, July 9, 1980.

[h] Regional Air Quality Management Plan, OKI Regional Council of Governments, 1979.

[i] Source - Personal communication with R. Froehlich, OKI, July 9, 1980.

[j] Source - 1978 SIP for Transportation Related Emissions, KIPDA, November 1978.

[k] Source - Ohio SIP, Dayton AQCR, May 1979.

It could not be ascertained the extent to which growth projections took into account such things as development of new and improved control technology, changes in population growth patterns, and especially changes in sources of energy. For example, the Mobile I[12] program to calculate emissions from motor vehicles requires a projection of vehicle miles traveled (VMT). The spiraling cost of gasoline may well cause many commuters to make a very rapid move toward use of public transportation.

3.8.2 Modeling

Although several different dispersion models and/or rollback methods were used in the SIP's and PSD planning processes, the general selection procedure and concerns voiced in each state for each pollutant were similar. Selection criteria were based on:

- EPA acceptability
- time constraints
- resource constraints
- data base limitations
- model applicability and representativeness
- complimentary use of monitoring/modeling.

The actual modeling method differed from area to area, even though the same model may have been selected; e.g., Louisville applied a basic rollback technique to CO emissions, whereas Dayton split the rollback analysis into weighted urban and suburban portions. All of the modeling processes were generally commensurate with the level of detail of the data bases. Some of the models used in the SIP and PSD processes include:

- SO_2

  CRSTER
  RAMR
  Multisource CRSTER
  CRS-1
  PTMAX
  Valley

- TSP

  CRSTER
  AQDM
  Modified CDM
  Linear Rollback

- Ozone (HC)

  EKMA
  Linear rollback

- NO_x

  No modeling

For ozone only simplified linear rollback or Empirical Kinetic Modeling Approach (EKMA) were chosen to estimate control of hydrocarbon emissions. These methods are inexpensive to run and much less data intensive than any of the newer reactive, numerical models for ozone and much closer in comparability to the data available for their use. Costs and data availability played a major role in the modeling process chosen for all pollutants in the Ohio River Valley Area. The availability of good emissions data, source characterization, source differentiation, meteorological data, and an existing off-the-shelf model results in a more detailed and accurate modeling study (e.g., the CRSTER applications to the proposed power facilities). In each case, available monitoring data were used as a background level, as input to the models (additivity and transport to EKMA), as an indication of model accuracy, as calibration values, and as

baseline concentrations for determining spatial and temporal distributions of violations or PSD increment use. Section 6 presents a detailed review of the models, methods, and related issues used in the SIP's and PSD actions.

3.8.3 Emission Reduction Strategies

An emission control strategy consists of a set of compatible emission standards. Each standard limits emissions from specific types of operations, e.g., fuel combustion, industrial processing, or solid waste disposal. The combination of several standards included in a strategy defines the allowable emission levels from each source in an AQCR or county within a state. According to the 1977 Clean Air Act Amendments, each state is required to identify the areas within their jurisdiction that are not attaining the NAAQS. The states were required to revise their Implementation Plans for these nonattainment areas in order for the ambient air quality standards to be attained by December 31, 1982, or in the case of photochemical oxidants, by 1987. In developing new control strategies for these nonattainment areas, the first step was to develop a comprehensive emissions inventory for all sources within the area. The emission inventory was then projected for 1979, 1982, and 1987. Based on these updated inventories and dispersion modeling studies, each of the nonattainment areas were analyzed in order to determine which sources were contributing to the air quality problem. In some instances, it may have been decided that no revision to the control strategy was necessary since violations of the ambient air quality standards were the result of noncomplying sources. Each of the

control strategies developed by Indiana, Kentucky, and Ohio follow basically the same pattern as described above.

Indiana--

In Indiana the development of control strategies for sulfur dioxide and particulates consisted of projecting air quality and selecting necessary control measures to meet the primary air quality standards by 1982. Control strategies for stationary sources of particulates were based on reasonably available control technology. Considerations for particulate emissions control from industrial point sources included the application of the following types of control equipment: baghouses, scrubbers, and electrostatic precipitators. Control measures such as paving unpaved parking lots and reducing open burning will be evaluated further to determine their benefits relating to control of non-traditional sources of particulates.

Strategies to control SO_2 pollution basically limit SO_2 emissions from industrial operations and power generating stations, which presently use high-sulfur fuels. These measures include the use of low-sulfur fuels, increasing the stack heights to acceptable limits, and coal beneficiation.

Strategies for reducing ozone levels focused on controlling emissions of the photochemically reactive hydrocarbon precursors of ozone. Major stationary sources such as tank farms and industrial solvent processes will be controlled by the application of RACT determinations. Reduction of hydrocarbon emissions from mobile sources involves establishing air quality objectives in

the transportation planning process. This has been accomplished by utilizing the metropolitan planning organizations. These institutions have selected strategies that are reasonable for their local areas, consistent with other community goals, and effective in reducing pollution. These strategies may include the following transportation control measures:

- Control vapor emissions from fuels and solvents
- Establish a motor vehicle emission inspection and maintenance program
- Improve traffic flow
- Expand auto-restricted zones
- Improve bicycle facilities
- Improve public transit
- Establish park-and-ride lots
- Establish exclusive bus and carpool lanes
- Make long-range transit improvements
- Establish carpools and vanpools
- Discourage single-occupancy auto use
- Establish staggered work hours
- Control on-street parking
- Limit road use by common carriers
- Control extended idling of autos
- Convert fleet vehicles to cleaner fuels or engines
- Retrofit heavy-duty vehicles with emission control devices
- Reduce extreme cold start emissions

Kentucky--

Control strategies developed in Kentucky were based on reasonably available control technology for stationary sources of particulates and sulfur dioxide. Emission inventories for both pollutants were updated and projected into future years. The estimates of air quality in 1982 and 1987 indicated that particulate levels will increase in most areas, based on the existing control scenario. Additional controls were determined to be necessary for attainment of the primary and/or secondary NAAQS.

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Based on a review of the air quality impact of specific source categories in nonattainment areas and investigations conducted by EPA researchers over the last several years, the particulate nonattainment problem seems to be associated with nontraditional particulate sources. A study of the existing point-source particulate regulations in Kentucky compared with the regulations governing sources in adjacent states, and an analysis of the point-source contribution files from dispersion modeling results indicated that Kentucky's existing point-source particulate regulations represent RACT. Therefore, all additional particulate emission controls necessary for the attainment of primary and/or secondary ambient air TSP standards will be obtained from nontraditional sources (paved roads, unpaved roads, and construction activities). Because of the difficulty in estimating emissions and defining control procedures for regulating or reducing emissions of these source categories, further investigation is required. The KDNREP has pledged to develop and conduct a plan for investigating and controlling nontraditional sources of particulate emissions in the Commonwealth of Kentucky.

Air quality modeling results for sulfur dioxide were used to establish emission limits on specific point sources in each nonattainment area. A review of the analyses performed for the 1975 SIP revision and the projected growth in emissions indicate that no additional controls will be necessary to attain the primary and/or secondary standards in the study area. Current Kentucky

regulations represent some of the most stringent limits on SO_2 emissions from point sources in the Nation. Based upon these analyses, RACT is already in place for all point sources located in the Ohio River Valley Study area.

Strategies for reducing ozone levels centered around reducing hydrocarbon emissions. Emission inventories were updated and projected into future years. Liner rollback modeling was conducted in the Louisville AQCR, and EKMA was used in the northern Kentucky portion of the Cincinnati AQCR to determine the required HC reductions for each nonattainment area. The RACT regulations were applied to stationary sources in the nonattainment areas. Air quality objectives for reducing hydrocarbon emissions from mobile sources were established by utilizing the MPO's in the Louisville and northern Kentucky areas. The KIPDA developed the transportation control strategies for the Louisville AQCR. These strategies were divided into three sections: (1) strategies adopted and implemented, (2) strategies adopted but not yet implemented, and (3) strategies to be studied further. Strategies adopted and implemented include:

- Metro Louisville Carpool project
- Improvement of public mass transit
- New construction or improvement of existing facilities

Strategies adopted but not yet implemented include:

- Center city study
- Inspection/maintenance
- Five-year transit authority of River City improvement program
- Long-range plans for bicycle paths

Strategies to be studied include:

- Reduction of extended idling of vehicles
- Fleet vehicle control, including alternative fuels
- Retrofit of emission controls on heavy-duty vehicles
- Reduction of emissions from extremely cold starts
- Vapor recovery from fuel transfer and storage
- Exclusive bus and carpool lanes to augment areawide carpool programs
- Common carrier pickup and delivery
- Long-range improvements and transportation policies

Strategies to reduce transportation-related emissions in the northern Kentucky area were very similar to those developed in the Louisville area.

Ohio--

Development of control strategies for sulfur dioxide and particulates consisted of projecting air quality and selecting control measures to meet the NAAQS in the time frame prescribed. Before specification as a possible control technique, each of the strategies was considered as to availability, applicability to the process, potential removal efficiency, and costs. The OEPA has not completed all the dispersion modeling studies required for the analysis of particulate regulations. They expected, however, that the existing point-source particulate regulations will meet present RACT determinations. The particulate nonattainment problem in Ohio seems to be associated with nontraditional particulate sources. A new regulation has been developed for fugitive dust sources that will require the installation of RACT. The RACT determinations for nontraditional sources are expected to be on a case-by-case basis, but further investigations are necessary.

Air quality modeling results have been completed for sulfur dioxide. An examination of the existing SO_2 point-source regulations indicate that they meet present RACT determinations. Therefore, no changes were made in these Ohio SO_2 point source regulations.

Control strategies developed for ozone focused on the control of hydrocarbons. Modeling results using EKMA in the Cincinnati area, Linear rollback in the Dayton AQCR, and Mobile 1 for both areas established the reductions required to meet the NAAQS. Once the required reductions were determined and the air quality projected, regulations were developed for stationary sources. These new regulations followed the guidance in the Control Technique Guideline documents developed by EPA that specified control strategies for emissions from volatile organic compounds (VOC).

For mobile sources, the MPO's (OKI and MVRPC) evaluated and selected transportation control measures (TCM) for their applicability and effectiveness in each of their regions. The TCM's selected by each MPO is similar in organization and content to those selected in the Louisville metropolitan area.

3.8.4 Monitor Siting and Quality Assurance Requirements

It has been difficult in the past to determine air quality trends or to compare them among major population centers because monitor siting, quality assurance procedures, and sampling methods used to differ among monitoring sites. Recognizing this problem, the Standing Air Monitoring Work Group (SAMWG) has encouraged the

development of a network of National Air Monitoring Stations (NAMS) from which consistent air quality data can be gathered and subjected to trends analysis. Establishing the NAMS has provided comparable air quality data from nationwide monitoring sites. These data will form the basis for accurate assessment of air quality problems. Specific requirements for both NAMS and State and Local Air Monitoring Stations (SLAMS) have been explicitly specified in EPA's Ambient Air Quality Surveillance Regulations (40 CFR 58, May 10, 1979).

Based on population statistics and currently available air quality data, the number and location of NAMS monitoring sites have been determined. Designation of NAMS sites was established through a cooperative effort between EPA's Office of Air Quality Planning and Standards, EPA regional offices, and state regulatory agencies. Specific siting criteria concerning the height and placement of monitors are described in the regulations. These criteria have been established to assure uniformity in the generation of monitoring data nationwide. The NAMS network is operated by the state and local regulatory agencies. Funding for this task comes through the Federal EPA via Section 105 CAA grants. Data generated by the NAMS network are submitted to the EPA regional offices for input into the Storage and Retrieval of Aeromatic Data (SAROAD) program. This program is then used to analyze nationwide trends. The state and local agencies utilize the NAMS data in their own SLAMS system.

The SLAMS network is implemented at the discretion of the state agency. Specific siting criteria concerning the height, placement, and location of monitors are based on an assessment of each state's needs relating to the fulfillment of their individual program requirements.

Each state is required to develop and implement a quality control program for SLAMS consisting of policies, procedures, specifications, standards, and documentation necessary to:

1. Provide data of adequate quality to meet monitoring objectives
2. Minimizing loss of air quality data as a result of malfunctions or out-of-control conditions

The quality control program must be described in detail, suitably documented, and approved by the Regional Administrator.

As a minimum, each quality control program must have operational procedures for each of the following activities:

- Selection of methods, analyzers, or samplers
- Installation of equipment
- Calibration
- Zero/span checks and adjustments of automated analyzers
- Control checks and their frequency
- Control limits for zero/span and other control checks, and respective corrective actions when limits are surpassed
- Calibration and zero/span checks for multiple-range analyzers
- Preventive and remedial maintenance
- Quality control procedures for air pollution episode monitoring

- Recording and validating data
- Documentation of quality control information

By January 1, 1980, each state must adopt and submit to the EPA Administrator revisions to their implementation plans that reflect the NAMS and SLAMS requirements specified in the Ambient Air Quality Surveillance Regulations. Final network designations must be implemented by January 1, 1983.

3.8.5 Enforcement Mechanisms

Each of the states in the study area utilize basically the same enforcement mechanisms. Because of interrelated responsibilities, enforcement, and source surveillance are generally organized into a single program consisting of a program director and two operating sections. Figure 3-1 illustrates an example organizational chart. The names of each section may vary by state, but the functions remain the same.

The operations section is responsible for inspecting stationary sources, following up citizen complaints, detecting unpermitted sources, verifying that each source meets its compliance schedule, issuing citations of violations, and assisting in legal activities. Each inspector, on a scheduled basis, inspects all assigned stationary sources of air pollution within a designated area of responsibility. During regular inspections, the inspector checks compliance with applicable permits and regulations, progress in compliance schedules, and determines if there have been any process equipment additions or deletions. The inspector also investigates all citizen complaints in the assigned

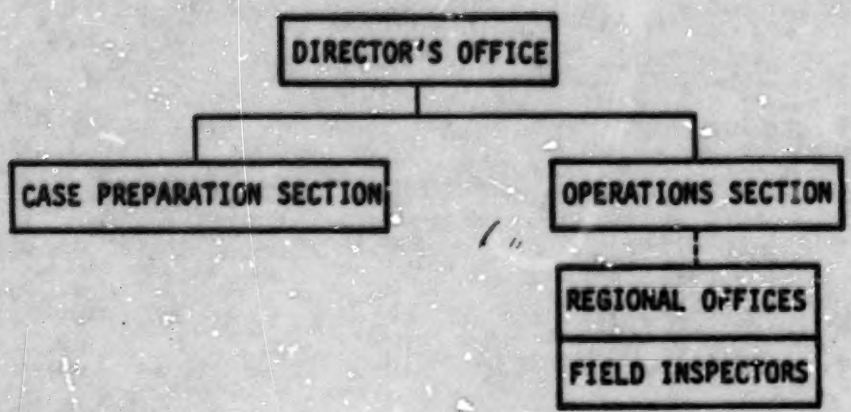

Figure 3-1. Example organizational chart of state enforcement and source surveillance programs.

area and affects remedial action for any illegal condition(s) responsible for an air pollution problem.

The states in the study area can implement the following sanctions against violating companies (in some cases these sanctions are implemented through the courts):

- Notices of violation
- Negotiations
- Administrative compliance orders
- Consent decrees
- Penalty proceedings
- Noncompliance penalties
- Court proceedings (in some cases only criminal)
- Delayed compliance schedules
- Requiring source to pay for stack tests
- Requiring source to reduce its operation rate (through the permit system)

When an inspector determines that a source is in violation of air pollution control regulations, the case is reviewed and a citation may be issued to the firm. This citation states the offense and gives a date when full compliance shall be achieved. Should a follow-up inspection determine continuing violation, the case is referred to the case preparation section. The field inspectors provide assistance in the preparation of legal cases and serve as witnesses as needed.

The case preparation section provides para-legal assistance in preparing all cases for which legal action is required. All surveillance reports, violation notices, office conference reports,

and correspondence germane to building a strong legal case are brought together.

In some cases, where the offenses are not defined clearly enough or deemed serious enough to warrant immediate court action a meeting or informal hearing is held. During this meeting allegations are succinctly presented by the staff and the company is given the opportunity to show cause (if any) why legal action should not be immediately initiated against it.

If the case can be resolved in a satisfactory manner, the staff may negotiate a Delayed Compliance Order (with or without penalties), and no legal action is taken. On the other hand, if the company cannot give sufficient evidence to be exonerated from the charge or if the company and the control agency cannot reach a satisfactory agreement, the case is referred to the Office of Attorney General (in some states referred to as the Office of General Council).

The Office of Attorney General, after a thorough review of the facts, may schedule a formal hearing before a hearing officer. In a formal hearing, the hearing officer, after hearing sworn testimony from both sides, determines if the regulations were being violated and the amount of penalty to be levied. The conditions of settlement will also include a compliance schedule if appropriate. His recommendations are then forwarded to the State regulatory agency for review and final approval.

Each of the local regulatory agencies are required to meet the same minimum enforcement activities as employed by the state

regulatory agency. The organizational set-up of a local agency may vary slightly from that described above for the state agency. Because of the smaller area of jurisdiction, the local regulatory agencies often follow a more stringent enforcement program.

3.9 FINANCIAL/MANPOWER RESOURCES NECESSARY TO IMPLEMENT AND ENFORCE ADOPTED SIP PROVISIONS

Air pollution control activities within the area covered by the Ohio River Valley Study are provided by two EPA regional offices, three state agencies, and three local agencies. Detailed information relative to the financial and manpower resources contributed to the study area by each of these agencies was not readily available. Table 3-2 presents a summary of the information that was provided by the respective agencies. The most specific information was obtained from the local agencies. Information obtained from the state regulatory agencies pertains to the total state program. None of the state regulatory agencies was able to determine the portion of total work years and funding applicable to the study area. Similarly, information relative to the cost of air pollution control activities at the Federal level that are applicable to the study area was not readily available from the two EPA regional offices. Region V estimated that in 1979 the average state spent approximately 116 work years in developing and implementing their SIP. During this same time frame, the regional office estimated they spent approximately 190 work years for the six states under their jurisdiction.

TABLE 3-2. MANPOWER AND FUNDING NEEDED TO MAINTAIN AND ENFORCE AIR POLLUTION PROGRAMS

Agency	Work years		Estimated funds	
	1979	1980	1979	1980
U.S. EPA				
Region IV[a]	NA	NA	NA	NA
Region V[b]	NA	NA	NA	NA
State				
Kentucky[c]	138	149.75	2,877,833	3,374,271
Ohio[b]	104.5	116.5	3,136,249	3,909,448
Indiana[b]	109	108	2,750,549	3,236,984
Local				
Jefferson Co. APCD[d]	44.0	44.4	818,312	885,755
Southwestern Ohio APCA[e]	58	51	1,401,747	1,622,113
RAPCA[f]	42.5	41.5	1,101,661	1,199,675

[a] U.S. EPA Region IV, personal communication; June 20, 1980.

[b] U.S. EPA Region V, personal communication; June 27, 1980.

[c] Reference 13.

[d] Reference 14.

[e] Reference 15.

[f] Reference 16.

NA - Not available.

For the three local regulatory agencies, the budgeted funding for 1979 was approximately $3.3 million and for 1980 it is $3.7 million. For the most part, this increase reflects inflation; the total work years of effort decreased from approximately 14.4 in 1979 to 13.7 in 1980.

The EPA Region V office reported a net decrease of nine positions from 1979 to 1980 as a result of a general reduction in government spending. The KDNREP reported that current staffing levels are down because of a 15 percent position vacancy. A Statewide personnel cutback to balance the State's budget will require a further reduction in personnel levels of 5 percent. The agency recognizes that this reduction in staff will require a reassessment of program priorities.

The OEPA had projected a need for 117 positions for 1980. At the present time only 104 of these positions are filled. A Statewide freeze on hiring is now in effect. Officials of the OEPA are quite concerned about their ability to implement and enforce the SIP.

Currently, the State of Indiana Air Pollution Control Division has a staff of 105 full-time employees and six Federal assignees. As such, they are the only one of the three States with staffing above that projected in their 1980 budget.

Tables 3-3 and 3-4 present a more detailed breakdown of the manpower and financial resources available to the three local regulatory agencies.

TABLE 3-3. PREDICTED MANPOWER AND FUNDING NEEDED BY JEFFERSON COUNTY AIR POLLUTION CONTROL DISTRICT

Category/subcategory	Work year		Estimated funds	
	1979	1980	1979	1980
Office of Secretary-Treasurer				
Program development & management	1.5	1.7		
Administration	0.5	0.5		
Legal service	1.0	1.0		
Subtotal	3.0	3.2	71,230	78,353
Planning and support				
Planning and analysis	2.0	2.0		
Inspection/maintenance	6.0	6.0		
Clerical support	5.0	5.0		
Public assistance	1.0	1.0		
Supervision	1.0	1.0		
Subtotal	15.0	15.0	281,502	309,652
Engineering and enforcement				
Field surveillance	6.0	6.0		
Enforcement	3.0	3.0		
Compliance engineering and analysis	6.0	6.0		
Management and supervision	1.5	1.5		
Training	0.5	0.5		
Subtotal	17.0	17.0	286,960	301,268
Air monitoring				
Network operation	2.6	2.6		
Laboratory operation	1.4	1.5		
Quality assurance	2.5	2.5		
Maintenance	0.8	1.0		
Special studies	0.3	0.3		
Training	0.4	0.4		
Management and supervision	1.0	1.0		
Subtotal	9.0	9.3	178,820	196,482
Total	44.0	44.5	818,312	885,755

TABLE 3-4. PREDICTED MANPOWER AND FUNDING NEEDED BY OHIO LOCAL AGENCIES WITHIN THE AREA OF STUDY

Category/subcategory	Hamilton County[a]				RAPCA[b]			
	Work years		Estimated funds		Work years		Estimated funds	
	1979	1980	1979	1980	1979	1980	1979	1980
Administrative services								
Training	0.2	0.2	6,669	6,425	1.3	1.4	33,698	40,471
Public education/information	1.5	0.5	43,035	16,062	1.3	1.2	33,698	34,689
Intergovernmental activities/planning	1.3	1.3	36,470	41,760	4.2	3.7	108,870	106,959
Program administration/management	9.0	7.0	215,482	208,691	6.4	4.2	165,897	121,413
Subtotal	12.0	9.0	301,656	272,938	13.2	10.5	342,163	303,532
Enforcement services								
Facility inspections	17.5	14.5	403,174	485,785	4.9	4.3	127,015	124,307
Complaint investigations	3.0	2.0	73,010	64,246	2.0	3.0	51,843	86,723
Compliance monitoring (review of time-oriented reports, stack tests, opacity readings, etc.)	1.5	1.5	36,505	48,185	3.0	7.4	77,764	213,918
State enforcement support								
Initiation or recommendation of enforcement action	1.0	0.8	23,999	25,699	2.5	1.0	64,804	28,908
Litigation support	0.8	0.2	18,378	6,425	0.7	0.5	18,145	14,454
Subtotal	23.8	19.0	555,056	610,341	13.1	16.2	339,571	468,307
Engineering services								
Permit application reviews	4.0	4.2	89,576	134,917	4.0	5.0	103,686	144,539
Emission inventory (update, review, data collection)	3.0	3.0	66,176	96,370	1.6	1.2	41,474	34,689
Emergency air spills (review of plans, implementation)	0.7	0.7	15,240	22,496	0.3	0.2	7,776	5,781
Episode response	0.3	0.1	6,470	3,213	0.3	0.1	7,776	2,891
Engineering support	-	-	-	-	1.4	-	36,290	-
Subtotal	8.0	8.0	177,461	256,986	7.6	6.5	197,002	187,900
Technical services/air monitoring activities								
Continuance of Ohio Air Sampling Network (OASN) - field support (purchase, installation, operation, maintenance, field calibration, sampling, quality assurance)	6.0	7.6	148,080	244,136	4.6	4.9	119,239	141,649
Continuance of OASN - laboratory support (sample analysis, calibration, quality assurance)	7.5	5.9	181,507	189,527	2.3	1.5	59,619	43,362
Data reporting	1.5	1.5	36,625	48,185	1.7	1.9	44,066	54,925
Subtotal	15.0	15.0	363,193	481,848	8.6	8.3	222,924	239,936
Total	58.8	51.0	1,397,366	1,622,113	42.5	41.5	1,101,660	1,199,675

[a] Reference 16.

[b] Reference 17.

Indiana and Ohio have adopted a schedule of fees for permits to install and operate sources that emit pollutants to the atmosphere. Section 110(a)(2)(K) of the CAA specifically provides that "the owner or operator of each major stationary source to pay to the permitting authority as a condition of any permit required under this Act a fee sufficient to cover:

> "(i) the reasonable costs of reviewing and acting upon any application for such a permit, and
>
> "(ii) if the owner or operator receives a permit for such source, whether before or after the date of enactment of this subparagraph, the reasonable costs (incurred after such date of enactment) of implementing and enforcing the terms and conditions of any such permit (not including any court costs or other costs associated with any enforcement action)."

Fees obtained for the issuance of permits in Ohio and Indiana go into the general State revenue fund. The Commonwealth of Kentucky is now preparing a permit fee regulation that will attempt to recover a portion of the cost of engineering and enforcement activities. It is estimated that the revenue obtained from permit fees will be:

Fiscal year	Income estimate
1978-79	$ 175,700
1979-80	300,000
1980-81	1,000,000

The Jefferson County APCD maintains its own permit fee system. Approximately $42,000 is derived each year through the permit fees.

It is readily apparent that fees for the issuance of permits to construct and operate major sources of air pollution will provide only a small portion of the total funding required to implement and enforce SIP provisions. Until such time as other

methods of generating revenue are implemented, the major portion of the cost of operating air pollution control programs must be covered by existing taxing mechanisms.

3.10 STATUTORY AUTHORITY AND PUBLIC SUPPORT NECESSARY TO APPLY SIP/PSD PROVISIONS

Indiana, Kentucky, and Ohio have provided the basic enabling authority to carry out each State's implementation plan. The enabling legislation passed in each State meets Federal requirements specified in 40 CFR 51, Section 11.

For instance, the Indiana Air Pollution Control Law, IC 13-1-1, and the Indiana Environmental Management Act, IC 13-7, provide the legal authority for development and implementation of Indiana's control strategy for attaining and maintaining the National Ambient Air Quality Standards. Indiana's Air Pollution Control Law, as amended, establishes a State Air Pollution Control Board (the Board) that has vested authority to take the following actions:

- Make investigations, consider complaints, and hold hearings.
- Enter such orders or determination as may be necessary to effectuate the purposes of the Act.
- Adopt and promulgate reasonable rules and regulations consistent with the general intent and purposes of the Act.
- Bring appropriate action to enforce its final orders or determinations under the Administrative Adjudication and Court Review Act.
- Provide by rules and regulations for control of emissions from motor vehicles.

The Air Pollution Control Law provides that it shall be a Class C Infraction for any person to:

- Refuse to comply with any order of the Board.
- Hinder, obstruct, delay, resist, prevent, or interfere with the Board and its personnel in the performance of any duty.
- Refuse entrance at reasonable hours to any premises after proper identification or presentation of a written order of the Board has been made.

Each day of a violation constitutes a separate offense. A Class C Infraction imposes a fine of up to 500 dollars.

The Indiana Environmental Management Act, as amended, provides for unified comprehensive environmental development and control for the State. This provides that the Board is authorized to take all action necessary or appropriate to secure the benefits of the Federal Clean Air Act and supplements the Board's powers and duties with the powers and duties specified in the Environmental Management Act.

The Environmental Managment Act specifically prohibits persons from:

- Discharging, emitting, causing, allowing, or threatening to discharge, emit, cause, or allow any contaminant or waste, including any noxious odor, into the environment in any form which causes or would cause pollution, which violates or would violate regulations or standards adopted by the Board or appropriate agency.
- Constructing, installing, operating, conducting, or modifying without prior approval of the Board or an appropriate agency any equipment or facility of any type which may cause or contribute to pollution or which may be designed to prevent pollution.
- Conducting any salvage operation or open dump by open burning.

The Environmental Management Act provides for the imposition of either civil or criminal penalties or both for violation of any provision, regulation, standard, or order of the Board. The civil penalty is a maximum of $10,000 per day of violation and/or an injunction. The criminal penalty is imposed for negligent, reckless, or knowing violations, knowingly submitting any false information to the Board or agency, or for failure of a person to attend, or attend and refuse to answer any lawful inquiry or failure to produce any relevent documentary evidence within his control or custody in obedience to a subpoena or lawful request of the Board or agency. The criminal penalty is a 1-year prison sentence and a fine of up to $5,000 (efforts are being made to have the Indiana legislature increase this amount to $50,000 to bring this penalty in line with the Clean Air Act). Each day of criminal violation constitutes a separate offense, which is classified as a Class A misdemeanor.

State statutes for Kentucky and Ohio are very similar to the Indiana environmental legislation. During the Kentucky legislative session of 1966, the General Assembly enacted the Air Pollution Control Law of the Commonwealth of Kentucky (Kentucky Revised Statutes Chapter 224). This law provided basic enabling authority for the State Air Pollution Control Commission to establish permit systems, to inspect and test facilities, and to enforce control regulations through a system of administrative orders, hearings, and injunctions. The Clean Air Act (as amended)

imposed certain additional legal requirements that rendered the 1966 Air Pollution Control Law deficient. These deficiencies were remedied in the enactment of the Kentucky Environmental Law, which was amended in the legislative sessions of 1972, 1974, and 1978. The Kentucky Environmental Protection Law, Revised Statutes Chapter 224 (as amended) provides the enabling authority for the Department for Natural Resources and Environmental Protection to carry out the implementation plan.

The Ohio Air Pollution Control Laws (from Ohio Revised Code Title 37 and 57) and the Ohio Environmental Protection Agency Law (Ohio Revised Code, Title 31) provide for the same basic enabling authority as found in Indiana and Kentucky.

Each of these States has failed to pass statutory authority for an enforceable inspection and maintenance (I/M) program even though they are being threatened by U.S. EPA with sanctions. The responsibility for providing this authority now rests with the local jurisdictions. The city of Cincinnati has statutory provisions for I/M, and the city of Louisville and Boone County, Kentucky, are considering such provisions.

The public generally supports the States' environmental legislation. There is some resistance for an I/M program, but this resistance often surrounds controversies over equity and funding. A poll conducted in the Louisville area showed that the public supported an inspection and maintenance program. This show of support paved the way for an inspection and maintenance ordinance to receive local political support.

3.11 IMPACT FROM OTHER FEDERAL ENVIRONMENTAL PROGRAMS

Other federally mandated environmental programs such as water quality management, costal zone management, solid waste management planning, or the preparation of the environmental impact statements have had minimal direct impact on the development of implementation plans in the Ohio River Valley study area. Indiana, Kentucky, and Ohio lacked the manpower, funding, and time to research these programs and extract applicable information and data bases.

The OKI used growth projections from Section 208 of the Water Pollution Control Act during the development of control strategies for the transportation-related ozone implementation plan. Most agencies involved in the SIP planning process were aware of the possibility of future conservation orders from the Department of Energy (DOE); however, they expect these orders to have a minimal impact along the Ohio River. In this area, electricity is primarily generated by the combustion of coal, not oil. A cutback in oil imports will not severely impact the generation of electricity in the Ohio River Valley study area; therefore, the possibility that these orders may be issued had minimal impact upon the preparation of the implementation plans.

3.12 GROWTH AND PSD INCREMENT ALLOCATION

Each SIP takes into account changes in emissions from mobile and stationary sources resulting from growth in emissions from existing sources. Projected emissions from major point

sources were determined from growth projections provided by individual firms. Projected emissions from minor point sources and area sources, including transportation sources, were based upon the use of projected population and employment statistics and indices of economic growth. It could not be determined whether or not control strategies were selected to provide some additional margin for growth resulting from new and modified sources (not included in the industry growth projections for existing sources).

As stated previously, the three States have only recently been delegated responsibility for new source review under the PSD regulation. Work is now in progress to prepare the necessary SIP revision for attainment areas. To date, the policy relative to PSD increment allocation has been a "first come first serve" basis. Each applicant for a permit has been allowed to use as much of the remaining increment that is required. It is expected that each State will adopt a policy limiting each applicant for a permit to only a portion of the remaining allowable increment. Representatives of the various regulatory agencies indicate that the portion may be about 50 percent.

Problems with PSD increment allocation for the area along the Ohio River can be expected unless there is some consistency in policies between the three States. It is important that the three States also reach an agreement as to how increment consumption will be determined for an individual source, as well as how increment consumption will be tracked over the years ahead.

The problem that can be expected in the determination of increment consumption relates to the use of dispersion modeling. Consistent policies must be adopted concerning the selection of modeling procedures for sources located in the valley along the Ohio River. In addition, the concern over the use of Class A stability dispersion parameters must be settled, or lengthy litigation can be expected.

3.13 EFFECT OF INSTITUTIONAL COMPLEXITIES

The SIP planning process for the Cincinnati and Louisville metropolitan areas was made more complex because of the number of regulatory agencies and institutions that were involved. For each area, one local and two state regulatory agencies were involved in SIP planning. In addition, portions of each area fall under the jurisdiction of two EPA regional offices. Further, the MPO in each area acted as the lead agency for the development of the photochemical oxidant SIP revision. Finally, within each area, there are a large number of unique local governmental units.

Section 121 of the CAA requires that the state provide a process of consultation with local governments, designated organizations of elected officials of local governments, and Federal land managers. The local MPO's (i.e., OKI, KIPDA, MVRPC) were responsible for keeping such individuals and groups abreast of the issues involved in the planning process. Committees were established and newsletters were distributed to the affected groups and individuals.

Even within the regulatory agencies, there were serious problems with communications and with the interpretation of provisions of the CAA and policy directives issued by the EPA through the two regional offices. The regulatory agencies in adjoining states adopted a cavalier attitude and failed to promote a spirit of strong cooperation. The issues presented in the Section 126 actions are evidence of the failure on the part of adjoining states to jointly reach solutions that are agreeable to both sides.

The difficulty now being experienced in the study area to implement an enforceable I/M program for the control of motor vehicle emissions is further evidence of the effect of the institutional complexities within the area. Politicians at the state level have failed to pass the appropriate legislation to implement an I/M program. Local politicians faced with the threat of sanctions are now forced into a position of passing this legislation.

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SECTION 4

INTERSTATE DISPUTES

4.1 ACTIONS ALONG OHIO RIVER BETWEEN CINCINNATI AND LOUISVILLE

Section 126(b) of the Clean Air Act (CAA) as amended in August of 1977 provides a mechanism authorizing any state or political subdivision to petition the U.S. EPA to determine whether a major pollution source in another state is causing or has the potential to cause an interstate air pollution violation as provided in Section 110(a)(2)(E)(i) of the Act. The latter section prohibits any stationary source within a state from emitting any air pollutant in amounts that will prevent attainment or maintenance by any other state of any national primary or secondary ambient air quality standard, or interfere with measures required to be included in the applicable implementation plan for any other state under Part C of the Act to prevent significant deterioration of air quality or to protect visibility. After public hearings, the Administrator either makes a finding that Section 110(a)(2)(E)(i) is being violated or denies the petition. If a violation is found, Section 126(c) provides that operation of the source for more than 3 months after the finding has been made shall be a violation of the applicable implementation plan unless the Administrator permits continued operation of the source, conditioned on its compliance with emission limitations, under a

compliance schedule provided by the Administrator. Compliance with the requirements contained in Section 110(a)(2)(E)(i) must be as expeditious as practicable but no later than 3 years after the date of such a finding.

Within the Ohio River Valley Study area, two Section 126 petitions have been received by the Administrator. The first petition involved the Clifty Creek Power Plant of American Electric Power Company, which is operated by the Indiana-Kentucky Electric Corporation (IKEC). The Clifty Creek plant is located in Jefferson County near Madison, Indiana. The second petition concerns the Gallagher Power Station of the Public Service of Indiana (PSI) which is located in Floyd County, Indiana, across the Ohio River from Louisville, Kentucky. Both facilities fall under the jurisdiction of U.S. Environmental Protection Agency Region V, which is located in Chicago, Illinois. The Gallagher plant is in the Louisville Interstate Air Quality Control Region (AQCR 78), and Clifty Creek is in the Southern Indiana Air Quality Control Region (AQCR 83).

4.1.1 Institutional and Agency Involvement

Clifty Creek--

On December 19, 1978, Administrator of the U.S. EPA was petitioned by the Governor of the Commonwealth of Kentucky to initiate proceedings pursuant to Sections 126(b) and (c) of the CAA concerning SO_2 emissions from the Clifty Creek Power Plant. The issue relates specifically to whether or not these emissions prevent attainment or maintenance of the national primary or

secondary ambient air quality standards for SO_2 in the Commonwealth of Kentucky, or interfere with measures required to be included in the Kentucky State Implementation Plan (SIP) under Part C of the Act to prevent significant deterioration of air quality or to protect visibility.

On May 21, 1979, the notice of proceedings to solicit public comment was published in the Federal Register (44 F.R. 29495). On June 19, 1979, the public hearing was held in Louisville, Kentucky, where the principal participants attending included the Kentucky Department of Natural Resources and Environmental Protection, U.S. EPA Regions IV and V, and individuals from the Indiana-Kentucky Electric Corporation. The hearing panel was comprised of representatives from EPA Regions IV and V and other segments of the U.S. EPA. At this hearing it was announced that because final EPA modeling data were not yet available, the record of the hearing would remain open until 30 days after the date upon which the final data and technical support documentation became available. The availability of the EPA modeling results was announced on November 5, 1979, (44 F.R. 63552). The closing of the hearing record was set for December 5, 1979. On the latter date a notice of extension for the closing of the record was published in the Federal Register (44 F.R. 69978), on the basis of a request from the Indiana-Kentucky Electric Corporation that more time is necessary to prepare comments on the additional data. The hearing record was finally closed on January 15, 1980.

Gallagher--

On May 14, 1979, the Administrator was petitioned by the Air Pollution Control District of Jefferson County, Kentucky, to initiate proceedings pursuant to Sections 126(b) and (c) of the Clean Air Act, as amended in 1977, to make a finding that SO_2 dioxide emissions from the Gallagher Station were causing or contributing to violations of the SO_2 standards in Kentucky and were otherwise in violation of Section 110(a)(2)(E)(i). The notification of a hearing was published in the Federal Register (45 F.R. 17048) on March 17, 1980. The affected parties and general public were invited to submit written comments and a request to present testimony at the hearing. On April 17, 1980, the public hearing was held in Louisville, Kentucky. The principal participants included the Air Pollution Control District of Jefferson County, the U.S. EPA Regions IV and V, and the Public Service of Indiana. Other officials and agencies attending included the Office of the Judge/Executive of Jefferson County, the Mayor's Office of Louisville, the Kentucky Department of Natural Resources, and the Public Health Department. The hearing panel was comprised of representatives of the U.S. EPA Regions IV and V and Washington, D.C. Headquarters. Closing of the public hearing record was set for May 2, 1980, on which date the Federal Register (45 F.R. 29313) included an announcement that the date for closing the hearing record had been extended until May 19, 1980.

4.1.2 Intergovernmental Consultation and Interactions

Consultation among the Federal, state, and local agencies and the institutions involved in air quality planning and implementation follows the same path as described in Section 3.2. Cooperation and joint action across political boundaries present a monumental problem that is exemplified by the Section 126 petitions. Although the States of Indiana and Kentucky show air pollution problems, no mechanisms exist for solving these problems. The remainder of this subsection documents interactions that have occurred between these governmental factions relevant to Section 126 petitions.

In 1972, the State of Indiana SIP was submitted to the EPA for approval. The SIP included an SO_2 emission limitation of 1.2 lb $SO_2/10^6$ Btu of heat input for both of the affected plants. On May 14, 1973, the U.S. EPA published an approval of the Indiana SIP. Final compliance with the rule was required by April 1, 1975.

In 1974, Indiana adopted revisions to their SIP that changed the SO_2 emission limitation so that it would be in agreement with the Energy Supply and Environmental Coordination Act (ESECA) and submitted the SIP revision to U.S. EPA for approval. The State's revised plan classified Jefferson County as a Class C basin with no applicable emission limitation. The new regulations also did not impose an SO_2 emission limitation upon the Gallagher Station, but did require the installation of an ambient air monitoring system and maintenance of a 2-week fuel supply adequate to meet the 1.2 lb $SO_2/10^6$ Btu emission limitation in an emergency

situation. A switch to the low-sulfur content fuel would take place immediately upon receipt of an order by the State of Indiana during periods of adverse meteorological conditions. In 1976, these regulations were approved by U.S. EPA as revisions to the Indiana SIP. The SIP revision was disapproved for five counties (including Jefferson but not Floyd).

Early in 1978, Indiana submitted a request, under Section 107 of the CAA, that Jefferson County be designated as "unclassifiable" for SO_2. In 1979, the Indiana Air Pollution Control Division adopted a regulation limiting SO_2 emissions from fuel combustion sources located in areas designated as attainment or unclassifiable to 6 lb $SO_2/10^6$ Btu. Under Rule APC 22, the following areas were determined to be unclassifiable:

- Dearborn County
- Gibson County
- Jefferson County
- The portion of Porter County bounded on the north by Lake Michigan, on the west by the Lake-Porter County line, on the south by I-80 and 90 and on the east by the LaPorte-Porter County line
- Warrick County

The limitation of 6 lb $SO_2/10^6$ Btu was submitted to the Administrator as an SIP revision on July 3, 1979, and as of yet has not been approved by the Federal agency.

The 1972 Kentucky SIP required existing major coal-fired power plants in Jefferson County to limit emissions to 1.2 lb $SO_2/10^6$ Btu of heat input. For a major (1000 or more 10^6 Btu/h of heat input) solid-fueled facility in Trimble County across from

Clifty Creek, the 1972 SIP limitation was 3.5 lb $SO^2/10^6$ Btu. The current (1979) regulation included in the Kentucky SIP allows 6 lb $SO_2/10^6$ Btu for existing sources in Trimble County.

New sources for both Indiana and Kentucky are limited to 1.2 $lb/10^6$ Btu of heat input.

4.1.3 Public Participation

Section 126 actions have aroused a considerable amount of public attention. Most of the environmental and industry advocacy groups are concerned over the disparity between EPA regions on SO_2 standards. These groups find it hard to understand how U.S. EPA can draw a line on a map, separating two areas sharing the same pollution problems, and then allow such a differentiation between their regulations. Many people within these interest groups complained of the length of time it is taking to resolve the interstate disputes. Industry representatives believe that the double standard (one for Kentucky and one for Indiana) is difficult to gauge from a planning point of view. They feel uncertain about the possibility of a changing standard.

Clifty Creek--

The public hearing for Clifty Creek was held on May 21, 1979. Testimony was also given by the principal participants previously mentioned and by representatives of environmental groups such as Save-the-Valley, Inc., the Indiana Izaak Walton League, and the Knob and Valley Chapter of the Audubon Society. The environmental groups share a common viewpoint with the Commonwealth of Kentucky in voicing their support for the Section 126 petition. Each

expressed concern regarding protection of the public health and ecological hazards from the high ambient SO_2 concentrations and acid rain. A spokesperson from Save-the-Valley noted that the Clifty Creek plant emits 286,000 tons of SO_2 annually. This exceeds the amount of SO_2 generated in Jefferson County, Kentucky, which is highly industrialized. It was stressed that scrubbers to reduce SO_2 emissions from the plant should be considered. The Save-the-Valley representative alleged dissatisfaction with the development of current scrubber technology and questioned the wisdom of constructing new power plants within the Ohio River Valley region, especially when the inadequacy of SO_2 control technology has been so routinely demonstrated.

The environmental groups considered the monitoring network for SO_2 within the vicinity of Clifty Creek to be unsatisfactory. It was specified that placement of monitors was such that they were not representative of ambient pollutant concentrations in the area. It was their contention that some of the sites selected for the monitors do not provide data that are indicative of air quality a great deal of the time.

Representatives of the environmental groups stated their concern that modeling techniques used by EPA do not always adjust dispersion coefficients to properly reflect the impact of terrain conditions. This concerns the argument of "plains" vs. actual valley condition models as well as the problem evidenced by the definite "corridor effect" of SO_2 within the Ohio River Valley. An additional point addressed was that modeling results presented

by Kentucky show that Jefferson County, Indiana, should be designated as nonattainment for SO_2.

Gallagher--

Besides the principal parties involved in the dispute, the following groups were represented at the April 17, 1980, public hearing: Office of the Judge/Executive of Jefferson County, Mayor's Office of Louisville, Save-the-Valley, Inc., Louisville Audubon Society, Sierra Club, League of Women Voters, Kentucky Department of Natural Resources, Public Health Department, Jefferson County Medical Society, and National Council of Environmental Balance.

Alarmed from the loss of perspective businesses within the last several years, the Judge/Executive of Jefferson County and the Mayor of Louisville stressed two main community objectives in their respective testimonies: (1) the need for clean air to protect the public health and welfare and (2) the ability to attract new industry into Jefferson County. Both believe that the diversity in Kentucky and Indiana's SO_2 emission limitations places an unfair burden on Jefferson County, and will negatively impact the county's ability to attract new industry.

Save-the-Valley, Inc., expressed dissatisfaction with PSI's Gallagher plant and with coal-fired power plants in general. They believe that scrubbers installed in the units of Louisville Gas and Electric (LG&E) are inefficient and do not sufficiently limit

SO_2 emissions to protect the public's health, despite the fact that these installations use the most up-to-date scrubber technology.

The Louisville Audubon Society, Sierra Club, League of Women Voters, and Kentucky Department of Natural Resources supported the position of the Jefferson County Air Pollution Control District. These groups believe that emissions from Gallagher Station have an adverse effect upon air quality and contribute to violations of the NAAQS for SO_2 in Jefferson County, Kentucky. They urged the EPA to impose the 1.2 $lb/10^6$ SO_2 emission limit upon the Gallagher Station.

The Public Health Department and the Jefferson County Medical Society presented a discussion of the health effects of sulfur dioxide. Both groups sited epidemiological studies which indicate that sulfur dioxide causes an aggravation of chronic pulmonary diseases and a greater incidence of morbidity and mortality. Some of the studies cited indicate that sulfur dioxide can enhance the bronchial effects of ozone. In order to protect the public health, they requested EPA to make a judgment in favor of Jefferson County.

The National Council of Environmental Balance, however, claimed that the impact to human health is negligible when considering the small amount of sulfur dioxide emitted. They believe that the massive expenditure needed to install and operate pollution control equipment would be of better benefit if utilized for urban renewal and highway maintenance.

4.1.4 Technical, Legal, and Administrative Issues and Resolutions

The basic concern in both of the Section 126 petitions is that the allowable SO_2 emission rate in the State of Indiana (i.e., 6.0 lb/10^6 Btu) is not adequate to protect air quality in the Commonwealth of Kentucky. A discussion of specific issues involved in each petition is presented below.

Clifty Creek--

The two basic issues involved in this petition are:

(1) In interstate areas such as between Indiana and Kentucky, how should the economic and social burden of attaining the National Ambient Air Quality Standards be distributed? Should emission limitations be proportional to the contribution of the pollution source to the non-attainment problem, or should regulations from all sources within a given category of pollution sources be substantially equivalent to both states?

(2) To what extent should EPA permit unilateral relaxations of State Implementation Plans in interstate areas, and what limitations should be placed on relaxation of the State Implementation Plans relevant to the question of allowing growth for future development in the area?

Existing fuel combustion sources located in either Jefferson County, Indiana, or in adjacent Trimble County, Kentucky, are required to comply with an SO_2 emission rate of 6.0 lb/10^6 Btu. The KDNREP stressed its concern that excessive SO_2 emissions from the Clifty Creek Plant poses a serious threat to future industrial growth. Dispersion modeling, conducted by the KDNREP using the CRSTER model, indicated that emissions from the plant cause numerous violations of the secondary 3-hour NAAQS (i.e., 1300 $\mu g/m^3$ not to be exceeded more than once per year).

Dispersion model analysis calculated the highest second highest 3-hour concentration, including a background of 100 $\mu g/m^3$, to be 2335 $\mu g/m^3$. Based upon the results of the modeling, the KDNREP recommended that an emission limitation of 3.3 lbs $SO_2/10^6$ Btu of heat input be imposed upon the Clifty Creek plant. This recommended emission limitation includes allowance for a 10 percent growth for the area.

U.S. EPA Region IV presented testimony indicating that a dispersion model analysis calculated 3-hour SO_2 concentrations in excess of the secondary NAAQS. Subsequent to the hearing, further modeling studies that were conducted suggested that the emission limitation for the plant be set at 4.13 lb $SO_2/10^6$ Btu for existing fuel combustion sources in Indiana.

In testimony presented by IKEC, the basis of the Kentucky petition for a Section 126 Action was questioned. It was the position of IKEC that Kentucky had not provided adequate technical support for the claim that attainment and maintenance of NAAQS are jeopardized by emissions from the Clifty Creek Plant. The IKEC questioned the applicability of modeling techniques that use Pasquill-Gifford Class A dispersion coefficients. The IKEC stated that air quality monitoring data have never shown violations of the NAAQS for SO_2. Further, it was the position of IKEC that no PSD issue is involved in the petition because total SO_2 emissions from the plant have decreased over the past several years from 7.3 $lb/10^6$ Btu in 1977 to 6.86 $lb/10^6$ Btu in 1979.

IKEC testified that, as a result of a decision rendered by the Circuit Court of Indiana on November 11, 1975, the Clifty Creek plant is currently not subject to any SO_2 emission limitation. Because it cannot be demonstrated that the plant is operating in violation of an enforceable SO_2 emission regulation, IKEC maintained that there is in fact no basis for a Section 126 Action.

Gallagher--

The hearing record lists five issues involved in the Section 126 action as presented at the public hearing on April 17, 1980:

(1) Does the Gallagher plant cause or contribute to violations of the National Ambient Air Quality Standards in Kentucky?

(2) Are sources in Kentucky required to limit SO_2 emissions to correct ambient air quality standard violations that would be caused or contributed to by emissions from the Gallagher facility?

(3) Does the Gallagher plant adversely impact Kentucky's or Jefferson County's efforts to develop a State Implementation Plan that will attain and maintain standards or create a margin for future growth?

(4) Are there differences between the control requirements for the contested source and comparable sources in the affected state?

(5) Are there generally comparable emission limits for comparable sources in both States?

Suggestions solicited during the hearing concerning criteria to be used by EPA in resolving interstate disputes included:

- How should differences between state emission limits generally be compared against the estimated air quality of out-of-state sources and comparable in-state sources?

- What criteria should the Agency use when air quality impacts may be difficult to ascertain, in particular when multiple sources and pollution transport over considerable distances may be involved? In such a situation, should the Agency give a lesser weight to air quality impacts and more to differences in emission limits?

- Under what circumstances should the Agency consider reasonably available control technology to be sufficient in and of itself to avoid a finding of impermissible interstate interference or as a remedy for such a finding?

- Under what circumstances should the Agency require regionally uniform emission limits or uniform control technologies?

The Air Pollution Control District of Jefferson County, Kentucky, is concerned about future growth in the area impacted by emissions from the Gallagher Station. An allowable emission of 6.0 lb $SO_2/10^6$ Btu for the Gallagher Station offsets much of the gains that have been made from reducing SO_2 emissions from sources in Jefferson County. The following points reflect the position of the Air Pollution Control District of Jefferson County:

- Sources within the same air quality region should be treated in a fair and uniform manner. All regulatory activities, including establishing standards, applying models, and enforcing regulations, must be as nearly identical as possible for every source in the AQCR.

- Differences in EPA regional office policies should not be permitted to create inequities within this AQCR in violation of Section 301(a)(2)(A) of the CAA. Regional Offices should have clear policy direction in this matter.

- Floyd County, Indiana, and other appropriate parts of southern Indiana located within the Louisville Interstate AQCR should be declared nonattainment for sulfur dioxide as indicated by recent EPA-contracted and Indiana CRSTER modeling.

- Indiana's proposed SIP revision permitting a 6.0 $lb/10^6$ Btu emission standard for Gallagher Station must be disapproved as a violation of Section 110(a)(2)(E)(i) of the CAA.

- The PSI Gallagher Station must be declared out of compliance with the present Indiana emissions standards, which were adopted in 1974, and required to submit a control plan and schedule to expeditiously comply with nonattainment area provisions of the Act.

- Gallagher Station should be required at a minimum to apply RACT to its SO_2 emissions to achieve reductions comparable to those being met by other SO_2 sources in the same AQCR.

- Government operated air monitoring in the southern Indiana portion of the Louisville Interstate AQCR must be upgraded to a level in proportion to the sources and emissions in Indiana Counties, and sited in such a manner as to comply with Standing Air Monitoring and Work Group (SAMWG) requirements. Monitoring must be performed in the maximum predicted Gallagher impact area.

- PSI should install in-stack monitoring for SO_2 as required for all major SO_2 boilers in state and Federal law. The system must be designed to provide accurate, timely emission summaries on a periodic basis to government units, also required by law.

- Potential PSD increments available to this AQCR must not be unfairly consumed, but must be preserved for equitable use by both Jefferson County and southern Indiana.

- EPA Region V should take immediate steps pursuant to Section 113 of the CAA to issue a Notice of Violation to the Gallagher Station for its failure to meet SIP emission limits and initiate proceedings to collect appropriate civil penalties from the source for the period from August 7, 1977, until compliance is achieved.

Testimony presented by the EPA Region IV included the results of a detailed dispersion modeling analysis.* Based upon the modeling analysis, it was estimated that emissions from the Gallagher Station (i.e., operating in compliance with an emission

*An Analysis of the Impact Upon Air Quality in Louisville, Kentucky, from the Gallagher Steam Plant, U.S. Environmental Protection Agency, EPA 904/2-79-045, October 1979

limitation of 6.0 lb $SO_2/10^6$ Btu) will cause violations of the secondary 3-hour NAAQS of 1300 $\mu g/m^3$, but not the primary 24-hour NAAQS of 365 $\mu g/m^3$. The receptor at which the violation of the 3-hour secondary NAAQS would occur is located in the State of Indiana. Within the Commonwealth of Kentucky, the maximum impact of emissions from the Gallagher Station was calculated to be in excess of 608 $\mu g/m^3$ on a 3-hour basis and 126 $\mu g/m^3$ on a 24-hour basis.

Region IV of EPA included in its testimony the results of a dispersion model analysis in which emissions were considered from the Gallagher Station and from Louisville Gas and Electric Cane Run, Paddy's Run, and Mill Creek Plants. This analysis showed that when the LG&E plants are in compliance with an emission limitation of 1.2 lb $SO_2/10^6$ Btu and the Gallagher Station is emitting at 6.0 $lb/10^6$ Btu, the highest and second-highest 3-hour and 24-hour ambient concentration of SO_2 within the Commonwealth of Kentucky will be 608 $\mu g/m^3$ and 107 $\mu g/m^3$.

Testimony presented by the Jefferson County APCD stressed the fact that Jefferson County, Kentucky, has been designated as nonattainment for sulfur dioxide. The nonattainment designation results from the fact that measured violations of the SO_2 NAAQS have occurred at monitoring stations in Kentucky. The high ambient concentrations result from SO_2 emitted from all sources in the general area. These sources include the Gallagher Station, even though it is located in Indiana across the Ohio River from the City of Louisville.

Because of the nonattainment designation, any new or modified source proposed for Jefferson County is required to demonstrate offset. There must be a sufficient reduction in the SO_2 emissions from existing sources to more than offset the allowable emissions from the proposed new source. The Jefferson County APCD maintained that compliance by all the LG&E plants and the Gallagher Station with an emission limitation of 1.2 lb $SO_2/10^6$ Btu will result in the attainment of the SO_2 NAAQS in Kentucky. Further, when the area achieves attainment, there will be some ability for continued growth for Jefferson County. If the Gallagher Station is not required to reduce SO_2 emissions to a level comparable with that required for sources located in Kentucky, growth within the county would be severely restricted.

Testimony presented in behalf of Public Service of Indiana, owners of the Gallagher Station, questioned the use of wording in the March 17, 1980, Federal Register "Notice of Proceedings Under Section 126 of the Clean Air Act." The use of wording such as "caused," "contributed to," or "substantially contributed to" was deemed to be inappropriate. It was submitted that the only "inquiry to be made in this Section 126 hearing is whether a source in one state is emitting any air pollutant in amounts which will prevent attainment or maintenance of the National Ambient Air Quality Standard." Further, had the Congress intended to make "significant contributions" to the basis of a Section 126 hearing, Congress would have used that concept in Section 110(a)(2)(E) of the CAA regarding existing sources. The testimony

concluded that the qualitative assessment of "significant contribution" applies only to the listing process mandated by Section 126(a).

Public Service of Indiana maintained that the only question to be answered in the hearing was whether or not Kentucky can attain the NAAQS in spite of the emissions from the Gallagher Station. If, in fact, NAAQS can be attained in Kentucky by application of best available control technology to all sources located in Kentucky, then there is no violation of Section 110(a)(2)(E) of the CAA and there is no basis for the Section 126 hearing.

Additional testimony presented by PSI questioned the applicability of the CRSTER model to the Gallagher Station. It was stated that the method used by the CRSTER model to correct for terrain features is inherently conservative (i.e., predicts higher concentrations than actually occur). A model referred to as Enviroplan's 4141 Model is purported to more realistically portray the flow of a plume in uneven terrain. It was concluded that the use of a more "realistic approach to the plume height-elevation relationship" would have resulted in significantly lower estimates of the ambient SO_2 concentrations caused by the Gallagher Station.

Public Service of Indiana further questioned the use of hourly meteorological data as input to the CRSTER model. The assumption that meteorological conditions are constant over a 1-hour period is not realistic and does not take into account

the meandering of the plume during the course of its movement downwind from the stack.

4.1.5 Adequacy of Available Resources and Time Constraints

An issue in both of the Section 126 actions was whether or not the results of a dispersion model analysis are sufficient to substantiate violations of the NAAQS. Utility representatives stressed the point that dispersion modeling results alone should not be used to determine the attainment status of an area and questioned the legality of supporting the fact that a violation of an NAAQS had occurred without actual air quality data. There was a general feeling on the part of all who presented testimony at these hearings that there is a real need for more (and better) ambient air quality monitoring.

The lack of sufficient time to prepare adequate technical support documentation at the Section 126 hearings is evidenced by the fact that in both cases the hearing record was held open after the actual hearing in order to provide more time for all concerned to submit testimony. Further, the lack of sufficient resources to conduct a thorough modeling study is apparent from the fact that, for the Louisville area, only the four electric-generating plants were considered in the analysis. Neither the regulatory agencies nor the utility companies can afford the cost of modeling all sources in the area, even though the results of a more thorough analysis would provide a much better indication of the principal contributors to the air quality problem.

4.2 ADEQUACY OF SECTION 126 AS A MECHANISM FOR RESOLVING DISPUTES

Based upon the experience to date involving the two interstate disputes along the Ohio River, there is reason to question the adequacy of the Section 126 mechanism for resolving disputes. It is noteworthy that the record of the hearings for both of the affected facilities does not include testimony from the Indiana State Board of Health Air Pollution Control Board. In both cases the testimony in behalf of maintaining current emission levels was provided in total by representation of the owners of the plants.

As was discussed previously, the hearing for the Clifty Creek Plant was conducted on June 19, 1979, and the hearing record was closed officially on January 15, 1980. As of the date of this report, the Administrator has not announced a finding or denied the petition. It would seem that the Administrator has not complied with Section 126(b), which states:

> "...Within 60 days after receipt of any petition under this subsection and after public hearing, the Administrator shall make such a finding or deny the petition."

In reality there is absolutely no way that the Administrator could comply with the interpretation of Section 126(b) that he announce a decision within 60 days of the receipt of a petition. The actual steps in a Section 126 petition are as follows:

1. The petition is received by the Administrator.
2. The Administrator writes a public notice and gives reasonable time to all concerned to prepare testimony for the public hearing.

3. Announcement of the time and place of the public hearing is published in the Federal Register 30 days prior to the date of the actual hearing.

4. The hearing is held and the record is allowed to be held open for a reasonable time to allow all concerned to submit testimony.

5. Hearing Panel reviews all testimony and presents recommendations to the Administrator.

6. The Administrator reviews the recommendation of the Hearing Panel and reaches a decision.

7. The Administrator publishes final decision and/or rulemaking in the Federal Register.

8. A 60-day comment period is provided for proposed rulemaking.

9. Comments on the proposed rulemaking are reviewed.

10. Final recommendation for proposed rulemaking is made by the Administrator and published in the Federal Register.

The wording contained in Section 126 needs to be revised to properly reflect the total process involved in the response to a petition.

Based upon the complexity of the issues raised in the two Section 126 Actions, it is almost a certainty that regardless of the decision by the Administrator, the cases will go into the Courts. Litigation in these cases could well take several years.

4.3 INTERSTATE AIR QUALITY AGENCIES OR COMMISSIONS

Section 106 of the CAA encourages the formation of interstate air quality agencies or commissions as a means of developing air quality planning programs in interstate air quality control regions. Further, the Administrator is authorized to pay up to

100 percent of the cost of such air quality planning for 2 years. After 2 years, funding is limited to three-fourths of the cost of operating such an agency. An interstate air quality planning agency can only make recommendations to the governor of each state.

In order to "head off" interstate disputes before they reach a stage involving litigation an interstate air quality agency must be empowered to do more than recommend courses of action to the governor of a state. The Clean Air Act should provide that areas in adjoining states must negotiate emission regulations that protect the public health and welfare in both of the adjoining states.

SECTION 5

STUDY AREA DATA BASE REVIEW AND ANALYSIS

5.1 AIR QUALITY MONITORING DATA

Regulatory agencies are required to make routine measurements of the ambient concentrations of air pollutants for which national ambient air quality standards have been promulgated. Such data provide an indication as to whether or not air quality standards have been attained and are being maintained. The cost of installation and operation of air quality monitoring systems represents a significant portion of the total operating cost of an air pollution control agency.

Table 5-1 presents a summary of the air quality monitoring activities in the various portions of the study area. Regulatory agencies are using high-volume samples to measure 24-hour TSP concentrations at 100 sites throughout the study area. These agencies are making continuous measurements of SO_2 concentrations at 36 sites in the study area. In addition, they are operating 22 ozone, 6 hydrocarbon, and 12 nitrogen oxide analyzers.

Consistent with the EPA regulation on air quality monitoring (40 CFR 58), each regulatory agency has reviewed its total air monitoring program to ensure that reliable data are being collected. The location of each site has been compared with siting criteria included in the regulation. When the situation calls

TABLE 5-1. AIR MONITORING ACTIVITIES BEING CONDUCTED BY REGULATORY AGENCIES IN THE OHIO RIVER VALLEY STUDY AREA[a]

Area/county	TSP	SO_2[b]	Ozone	Hydrocarbons	Oxides of nitrogen[b]
Cincinnati					
Ohio					
Clermont	3	1	1		
Hamilton	25	5	5	4	5
Warren	3	1	1		
Kentucky					
Boone	4	4	1		
Campbell			1		
Kenton			1		
Indiana					
Dearborn	5	3	1		
Ohio					
Louisville					
Kentucky					
Bullitt			1		
Jefferson	15	5	3	1	2
Oldham					
Indiana					
Clark	3	2	2		1
Floyd	1	5			
Dayton					
Greene	3				
Miami	3				
Montgomery	11	2	3	1	2
Preble			1		
Butler	17	1	1		1
Ohio River Valley					
Indiana					
Jefferson	4	4			1
Switzerland	1	1			
Kentucky					
Carroll	1	1			
Gallatin					
Trimble	1	1			
Total	100	38	22	6	12

[a]Existing as of January 1, 1980.

[b]Continuous monitors considered only; i.e., no SO_2/NO_2 bubblers.

for it, sites are being relocated in order to be in compliance with the siting criteria. Each agency is now in the process of implementing a quality assurance program that will fulfill all requirements of the regulation.

For the most part, measured air quality data were used in the initial determination of the attainment status for the various portions of the study area. For the Dayton metropolitan area, RAPCA used measured air quality data for TSP and SO_2 along with a computerized mapping technique known as SYMAP[1] to determine precise geographical boundaries between attainment and nonattainment areas. For most other portions of the study area, the extent of the nonattainment area from the monitoring site at which violations of the NAAQS were observed was based upon judgment and knowledge of the locations of sources of emissions.

Region V of EPA revised attainment designations for SO_2 that State and local regulatory agencies in Ohio and Indiana originally made using measured air quality data. These redesignations were based primarily on the results of dispersion modeling. State and local regulatory agencies have objected to these redesignations on the grounds that the highest and second-highest SO_2 concentrations calculated by modeling are substantially higher than any measurements of air quality made in the respective areas.

5.2 EMISSION INVENTORIES

With the assistance of contractor support provided by the EPA, State and local regulatory agencies in the study area have been working on the preparation of an inventory of mobile and stationary source emissions for nearly 10 years. Emission inventories were developed under very tight time schedules in order to prepare the original SIP submissions in 1972. Since that time, a continuing effort has been made to update and broaden the coverage of each state's emission inventory. Each state uses a computerized emission inventory system (EIS) that generally possesses consistent data elements for each source.

The emission inventory data base for each State includes estimates of actual and allowable emissions of TSP, SO_2, NO_x, HC, and CO for each point source. Gridded area source emission inventories are available for the counties included in the Cincinnati, Dayton (including Butler County), and Louisville metropolitan areas. Gridded area source inventories have not been prepared for the counties along the Ohio River between but not including the Cincinnati and Louisville metropolitan areas.

Based upon the number of point sources included in the State emission data bases, there is reason to believe that every effort has been put forth to assemble a comprehensive data base. The accuracy of the data for each point and area source cannot easily be ascertained. The following equation is used to estimate actual emissions for a point source:

$$E = A \times F \times (1 - C/100)$$

where E = emission estimate

A = activity level

F = emission factor

C = control device efficiency

The accuracy of the resulting emission estimate is dependent upon the relative accuracy of each of the above components. Errors and assumptions introduced into any of these components can affect the final emission estimate.

Each source supplies the information on plant location, stack parameters, and activity levels for any individual facility or group of facilities. These data are generally obtained from the application for a permit or a questionnaire. An error is introduced if emitting activities occur that are not accounted for in the data obtained. If all the emitting activities are represented, then the error in the activity component is dependent upon accuracy and precision of the information obtained through the facility or from other sources. Usually, errors introduced into the activity component are made by the facility when completing questionnaires. These types of errors include:

- Rounding to insignificant figures
- Incorrect units
- Improper decimal placement
- Incorrect approximations

The emission factor is a critical component of the emission estimation equation. In some instances, the emission factor is

derived from actual source testing conducted at the facility, but most often emission factors are used from EPA's AP-42 "Compilation of Air Pollutant Emission Factors." These emission factors are based on a "typical" operation that may not be precisely applicable to a specific source; when applied to several sources, however, they can closely approximate emissions. Development of these emission factors have been subject to error and bias because of improper or incomplete test procedures and unaccounted for source (process) variations. The AP-42 report cautions that these emission factors should not be used indiscriminately, because they will not result in the calculation of accurate emission measurements from an individual installation.[2]

The final component of the emission estimation equation is the control device efficiency. Efficiency of the control device can be estimated fairly accurately by actual source tests. However, the estimated design efficiency of the control device calculated by the vendor is often used. Both of these estimates can be in error because of variations in control device operations such as differences in load and deterioration over time. Other considerations relating to actual operating efficiency, such as control equipment failure, are not reflected in the estimated control device efficiency.

Each component of the emission estimation equation can be a source of error leading to inaccuracies in the emission inventory. It is critical that the best information available for the source emission estimates is used. Since this information is not

updated continually as additional and possibly more accurate information is received, updating the emission inventories has become a crucial problem. The accuracy of the emission estimate is sensitive to each component of the equation; no component can be identified as unnecessary or of lesser importance.

Reentrained dust and area sources have been extremely difficult to quantify. This is mostly due to difficulties experienced in estimating their activity level and inaccurate emission factors. The data base used in developing emission factors for reentrained dust and area sources is subject to error and bias.

In summary, the major weaknesses of the emission inventory data bases include:

- Uncomparable and generally unique (not in the same format) state emission inventories
- Emission estimation components subject to bias and errors
- Difficulty in quantifying emissions from reentrained dust and area sources

5.3 METEOROLOGICAL DATA

Dispersion modeling conducted in support of SIP planning, Section 126 actions, and PSD permit review requires an extensive meteorological data base. For modeling annual concentrations of TSP and SO_2, meteorological data in the so-called STAR format are used. The STAR format provides the frequency of occurrence (usually over a 1-year period) of meteorological conditions by atmospheric stability class, wind speed, and wind direction. For short-term modeling, the models require hourly determination of

wind direction, wind speed, ambient temperature, atmospheric stability, and mixing heights.

For the most part, regulatory agencies obtain the necessary meteorological data from the National Climatic Center in Ashville, North Carolina. Data from the National Climatic Center are taken from hourly surface observations made at first-order stations of the National Weather Service (NWS) and twice-daily radiosonde measurements of upper air condition made at a limited number of first-order weather stations. The determination of hourly surface weather conditions made by the weather observer does not represent an average of the conditions existing over a 1-hour period. Rather it is a "snapshot" of the conditions that occur over a short period of time on the hour. This "snapshot" observation provides a very good indication of meteorological conditions averaged over a day or a year, but may not be representative of the average conditions that existed during a specific hour.

Until 1964, the data for each hour recorded by the weather observer were routinely entered into the meteorological data base maintained by the National Climatic Center. Beginning with the year 1965, only the data for every third hour are routinely processed and entered into the meteorological data base, which is available from the National Climatic Center. The use of data for every third hour was not deemed to introduce any substantial error into the results of dispersion modeling to calculate annual average pollutant concentrations. Data for only every third hour

are not suitable for short-term modeling that requires hourly meteorological data. For some years, it was necessary to use hourly data for years prior to 1965 as input to short-term models. More recently, the EPA provided funds to the National Climatic Center to prepare hourly data bases for a limited number of areas. Such data are available for the weather observation stations in the study area.

Two other deficiencies in the meteorological data bases available from the National Climatic Center are also worthy of mention in this report.

It is the practice of the Weather Bureau that the weather observer record wind direction to the nearest ten degrees. Because of the extreme sensitivity of short-term pollutant concentrations to wind direction, the EPA dispersion models use a preprocessor program that generates wind direction to the nearest degree. Very simply, the preprocessor uses a random number generator to select a value between -5 and +5, which in turn is added algebraically to the recorded wind direction. Thus, if the recorded direction is 100° and the random number generator selects -3°, the preprocessor would calculate a wind direction of 97°. Because of the randomization technique, over the long run no bias is introduced into the data base. For any individual hour, the calculated impact of a source-receptor response will be biased by the randomization procedure.

Another very important deficiency of the NWS data stems from the fact that surface weather observations are made at only three locations in the study area. These include Greater Cincinnati

International Airport, Dayton's Cox International Airport, and Louisville's Standiford Field. Because of the very limited NWS data base, there is strong reason to question the representativeness of meteorological data when they are typically applied to areas 10 to 15 miles and as much as 50 miles away. The NCAQ Atmospheric Dispersion Modeling Panel made a recommendation that the onsite data be collected for use in PSD model applications.[3]

Table 5-2 presents a summary of the sources of meteorological data used in dispersion modeling for the Ohio River Valley Study area. Upper air data from Dayton were used to determine mixing height for all portions of the study area. It is generally assumed by air pollution meteorologists that mixing height is relatively similar over large geographical areas, and as such would not differ significantly if upper data were available from Cincinnati and Louisville.

Modeling for Butler County, Ohio, was based upon surface weather data from the Greater Cincinnati International Airport, which is located approximately 25 miles from the city of Hamilton and 35 miles from the city of Middletown. It is very unlikely that meteorological conditions at the location of the airport in northern Kentucky are representative of conditions in either city. Similarly, modeling performed for the Clifty Creek Electric Generating Plant in Jefferson County, Indiana, relied on surface meteorological data from Cincinnati, which is nearly 50 miles away. Considering the channeling effect caused by the

TABLE 5-2. SOURCES OF METEOROLOGICAL DATA USED FOR DISPERSION MODELING IN THE OHIO RIVER VALLEY STUDY AREA

Area	Source of meteorological data	
	Surface measurements	Upper air measurements
Cincinnati Metropolitan	Cincinnati	Dayton
Dayton Metropolitan	Dayton	Dayton
Louisville Metropolitan	Louisville	Dayton
Butler County	Cincinnati	Dayton
Ohio River Valley		
Indiana		
Dearborn	Cincinnati	Dayton
Jefferson	Cincinnati	Dayton
Kentucky		
Carroll	Louisville	Dayton
Trimble	Louisville	Dayton

hills along the Ohio River, it is most unlikely that meteorological conditions in the vicinity of the Clifty Creek Plant are anything like those at the Greater Cincinnati Airport.

REFERENCES

1. Harvard Laboratory for Computer Graphics. User's Reference Manual for Synagraphic Computer Mapping 'SYMAP' Version V. Harvard University, Cambridge, Massachusetts, 1968.

2. Compilation of Air Pollutant Emission Factors. Third Edition. U.S. Environmental Protection Agency, Office of Air and Waste Management, Office of Air Quality Planning and Standards. Research Triangle Park, North Carolina. August 1977.

3. Summary Report of the NCAQ Atmospheric Dispersion Modeling Panel. Publication 5-AQ-7379./ March 1980.

SECTION 6

MODELING METHODS IN THE SIP PLANNING PROCESS

6.1 INTRODUCTION

Of primary concern in the development and implementation of air quality legislation is the use of pollutant dispersion modeling. As stated by the NCAQ Atmospheric Dispersion Modeling Panel (1980)[1]:

> "Two fundamental provisions of the Clean Air Act as amended in 1977, The National Ambient Air Quality Standards (NAAQS) and Prevention of Significant Deterioration (PSD), require the establishment of a link between emissions from a source and the resultant impacts (in the form of pollutant concentrations) at a receptor located some distance away. Atmospheric dispersion models provide the link between source and receptor by simulating the complex physical and chemical processes affecting a pollutant during transport."

Thus, the use of models is encouraged to resolve spatial and temporal deficiencies in available monitoring data and to evaluate variable control strategies and future year scenarios.

Varying methods of model selection, application, and interpretation have been used in the SIP planning process, which includes PSD studies. The objective here is to describe the modeling methodologies employed by Ohio, Kentucky, and Indiana in their SIP planning processes. In all cases modeling is used as a predictive tool to support and implement the objectives of clean air legislation. The following subsection gives an overview of

the modeling methodologies, the differences in approach and interpretation (e.g., SIP versus PSD), and the issues raised with respect to modeling and their resolution.

6.2 OVERVIEW OF THE MODEL SELECTION AND APPLICATION PROCESS

The use of models in the SIP process and in PSD permit actions is governed by several criteria. These criteria arise out of regional and Federal deadlines, guidelines on model use, model applicability and accuracy, and modeling capabilities of the responsible agency. Thus, criteria for model selection and application common to the three States in the Ohio River Valley Study area include:

- Time and resource constraints
- Agency expertise (including outside help)
- Emission inventory availability
- Meteorological parameter availability
- Model applicability (complex terrain, spatial distribution of sources, inert versus reactive, microscale versus mesoscale impacts, etc.)
- Model acceptability (validated, approved by EPA)
- Consistency (important in comparing results between sources, counties, and states) of inputs and modeling assumptions and applications

The first two criteria, time and resource constraints and agency expertise, dominate and control most of the other factors. In the case of the Ohio River Valley Study Area, the inadequacy of enough time and resources dictated by the July 1979 SIP revision deadline necessitated the need to use off-the-shelf modeling techniques. This choice is further dictated by the limited

availability of meteorological data. Thus, in most cases the Ohio, Indiana, and Kentucky SIP and PSD actions have used modeling procedures approved or recommended by EPA.

Even with the apparent consistency arising from similar needs and restraints, the methodologies chosen by each state or region are tailored to particular problems, resources, and pollutants. As an example, the Air Quality Display Model (AQDM)[2] was used to model gridded emissions and receptors in Louisville in order to estimate concentrations and related emission reductions needed for both point and area sources to achieve the particulate NAAQS. Newport, Kentucky, however, had fairly dependable total particulate emissions but very little spatial resolution of sources. Thus, only a linear rollback technique was used to estimate the needed TSP reduction.

The methodologies are strongly dependent on pollutant. Fairly well-known and accepted dispersion models exist for point sources that simulate the physical transport of inert, gaseous pollutants. On the other hand, models for fugitive sources with large-size particles (>15 μm) or models dealing with the reactivity of sulfur-or ozone-related pollutants are fairly new and are data and resource intensive. Thus, many detailed, often better validated techniques may not be used in preference for rollback-type procedures that are cheaper and easier to use (but not necessarily state-of-the-art).

6.3 DETAILS OF METHODOLOGIES CHOSEN FOR THE SIP'S

This section outlines the modeling methodology chosen for each pollutant by each state in the Ohio River Valley Study. They are arranged by pollutant to demonstrate the differences and similarities between SIP's.

6.3.1 Sulfur Dioxide

Kentucky--

Only one area in Kentucky in the Ohio River Valley Study is nonattainment for SO_2: the Louisville Interstate Air Quality Control Region including Clark and Floyd Counties (Indiana) and Jefferson County (Kentucky). The modeling in this case was performed for four major point sources of SO_2 emissions: three power plants in Kentucky and one in Indiana. In situations where stack heights exceed good engineering practice (GEP), the heights were reduced to GEP for modeling. The primary model used in this analysis was the CRSTER Model (EPA, 1977)[3] and a multisource CRSTER Model. Surface meteorological data for 1964 from Louisville's Standiford Field and upper air observations from Dayton's Cox International Airport were used in conjunction with CRSTER.

Previous modeling techniques used in a 1975 control strategy and modeling analysis included:

- CRS-1, worst-case 24-hour analysis assuming flat terrain
- PTMTP-W[4], screening technique
- Air Quality Display Model, all SO_2 sources analyzed for annual impact

The results of this analysis indicated that source types other than power plant facilities contribute very little SO_2 in comparison. No specification of industrial sources, controls, or source contributions was made in the SIP for sources other than power plants. The 1975 strategy was to limit the pound of SO_2 released per Btu rather than the percentage of sulfur per pound of coal. The results of this previous analysis were used to limit the new modeling performed using the CRSTER and multisource CRSTER.

Revised modeling was performed to verify for the 1979 SIP's that the NAAQS for SO_2 would be attained by 1982. Previous modeling indicated primary emphasis should be focused on the four local power facilities. Other SO_2 sources are assumed to be part of the background concentration in the Louisville AQCR. The maximum estimated 24-hour SO_2 concentration attributable to any individual source was 221 $\mu g/m^3$ from the Cane Run power plant. The maximum 24-hour concentration from all four power plants was estimated to be 233 $\mu g/m^3$. Thus, considering background, the sources were shown to be in compliance by 1982.

Indiana--

Modeling for Floyd and Clark Counties in Indiana is completely dependent on modeling performed for Louisville as described above. No additional modeling was performed for the SIP; however, in response to an interstate dispute, Indiana carried out limited modeling to demonstrate the impact of the Gallagher

Power Station. In accordance with the 1977 Clean Air Act Amendments, the Jefferson County, Indiana, SIP was reviewed and revised to reflect current emissions and air quality regulations. Four significant sources of SO_2 were modeled using the Real Time Air Quality Simulation Model[5], RAM (EPA, 1978) with a rural terrain option. The sources included, in Indiana, the Clifty Creek Power Plant and the Madison State Hospital, and in Kentucky, the Ghent Power Plant and the proposed Wise's Landing (Trimble County) Power Plant. Concentration estimates included the 3-hour and 24-hour averages. Results show a violation of the 3-hour secondary NAAQS for SO_2, indicating that the unclassified area should be reclassified as nonattainment. Through this analysis, Jefferson County is being proposed as an area where the Indiana proposed maximum ceiling of SO_2 emissions (6 lb/10^6 Btu) will be allowed.

Ohio--

Only sketchy information regarding dispersion modeling in Butler County, Cincinnati, and Dayton is currently available, because the SO_2 portion of the Ohio SIP is just presently being submitted to EPA for review. In Butler County all sources of SO_2 were modeled using a rural version of the RAM model (RAMR) with 1964 Cincinnati Airport surface and Dayton International Airport upper air meteorological data. Only 24-hour concentration estimates were made for a 1-km grid receptor network. No violations of the NAAQS were found.

In Cincinnati the SO_2 modeling analysis was divided into an urban rollback and rural RAM study. Most of the urban rollback analysis treated only the comparison of future design value to future emissions, since SO_2 concentrations were in attainment. Rollback analyses indicated continued attainment through 1982. Limited additional modeling of the Miami Fort power plant stacks using RAMR modified for complex terrain identified a few NAAQS exceedances. Full switching and adjustment of emissions inputs reduced concentrations to below the SO_2 standards.

Finally, results were not available for the SO_2 modeling in Dayton using an urban RAM model.

6.3.2 Total Suspended Particulates

Kentucky--

Two areas in the Ohio River Valley Study required a control strategy for TSP: the City of Newport and the Louisville AQCR. Modeling was performed in each case to estimate the level of TSP control needed to achieve and maintain the annual NAAQS. Only annual average emission inventories were available. The violation of the TSP standard in Newport was attributed primarily to area and fugitive sources for which the identification and spatial distribution was limited. Because of the time constraints and limited data base, the KDNREP opted to use linear rollback to estimate the degree of control necessary for sources of TSP emissions in the City of Newport. A background concentration of 30 $\mu g/m^3$ was assumed for the analysis. A reduction of 43 percent was estimated based on a 1975 TSP emissions estimate, a violation of

109 $\mu g/m^3$ of the annual average NAAQS, and the standard of 75 $\mu g/m^3$.

The AQDM was used to assess the extent of the TSP problem in the Louisville AQCR. Gridded area source emissions and point sources in and near the nonattainment region were modeled. Meteorological data summaries from Standiford Field in Louisville provided the necessary joint frequencies of wind speed, wind direction, and atmospheric stability. In an attempt to improve the modeling estimates, linear regression analysis of monitor values was used to calibrate the modeling results. A background concentration of 30 $\mu g/m^3$ was estimated based on the y-intercept calculated. Based on the 1982 and 1987 AQDM estimates for projected TSP emissions, and on current measured TSP concentrations, rollback calculations indicate that a 27 percent reduction is necessary in annual emissions to attain the primary standard by 1982.

Indiana--

Modeling of Floyd and Clark Counties in Indiana is completely dependent on modeling performed by the Louisville AQCR. No new modeling was performed. The other nonattainment area, Dearborn County, was modeled using a Modified-Climatological Display Model (MCDM)[6]. Modifications included:

- Calibration
- Choice of units (English or Metric)
- Larsen transformations (long- to short-term averaging times)
- Source contribution tables

The modeling methodology consisted of inputting base year 1975 emissions, projected 1985 year emissions, RACT emissions, and various other emission strategies to find the strategy that best achieves the NAAQS. Modeling was performed to supplement monitoring results. All meteorological data were input as joint frequency distributions based on observations made at Greater Cincinnati Airport from 1960 to 1964 and 1975. All point source locations were input to MCDM as well as gridded area source emissions. Area source emissions were allocated by street address (identifiable sources) or by population weighting. Modeling indicates that a combination of RACT (major sources) and control of area sources will be required to achieve and maintain the primary TSP NAAQS.

Ohio--

Three areas of concern to the Ohio River Valley Study required TSP dispersion modeling: Cincinnati, Dayton, and Butler County. Because no modeling results for TSP were available for review, analysis information is sketchy. Both Cincinnati and Dayton modeled TSP sources using calibrated versions of the Climatological Display Model (CDM). Butler County, however, utilized a modified CDM (MCDM) similar to that discussed for TSP modeling in Dearborn County, Indiana. The analysis considered both point and area sources and used 5 years of meteorological data. The major technical problem arising in all TSP modeling analyses involved the agreement between EPA Region V and Ohio EPA concerning modeling assumptions and applications.

6.3.3 Ozone

Kentucky--

The Louisville AQCR and the Boone, Kenton, and Campbell County regions of Kentucky are nonattainment for ozone. Both areas chose to control hydrocarbon emissions as the primary technique to achieve the ozone NAAQS. The method of analysis chosen for the northern Kentucky area (including Cincinnati, Northern Kentucky, and Southeast Indiana, i.e., OKI) is the Empirical Kinetic Modeling Approach (EKMA)[7]. Other methodologies dismissed were:

- Photochemical models, too data intensive and expensive
- Rollback models, ignores the interaction of precursors
- Statistical models, cannot account for changes in emission pattern from base period

The EKMA was thought to be the best compromise of simple versus complex models since some photochemistry and precursor relationships are included, but the application is fairly straightforward if the needed monitor values and proper default factors are applicable. Application of the standard EKMA ozone isopleths to estimate the necessary reduction of hydrocarbon emissions required an estimate of (1) local design value, (2) precursor ratio, (3) transported ozone (additivity), and (4) estimates of NO_x emission changes. These factors were estimated primarily from Cincinnati specific data except for the additivity estimate from the St. Louis Regional Air Pollution Study. Results indicate that a reduction of nonmethane hydrocarbons of 40 percent

is necessary to meet the 0.12 ppm NAAQS for ozone. Concerns noted include uncertainties in EKMA factors and in representation of the spatial ozone distribution.

In the Louisville AQCR a modified linear rollback technique was selected in lieu of a more sophisticated model. The method included some of the effects of ozone transport, additivity, and background, but did not consider the interdependence of the nonmethane hydrocarbon to oxides of nitrogen ratio and ozone concentration. Results indicated that control of mobile and stationary sources would enable Louisville to be in compliance by 1987 and meet the 44 percent reductions in hydrocarbon emissions required.

Indiana--

As part of the Louisville AQCR, Floyd and Clark Counties in Indiana were part of the same analysis as in the Kentucky SIP for ozone. These counties, therefore, were subject to the same requirement of a 44 percent reduction in hydrocarbon emissions.

Ohio--

As part of the OKI region, Hamilton County (Cincinnati) was modeled along with Northern Kentucky in the Kentucky SIP. Results indicate that a 40 percent reduction in hydrocarbon emissions is needed to achieve the ozone NAAQS. The OKI report included in the Ohio SIP goes on to comment that since the EKMA curves are used in a relative rather than an absolute sense, control requirements are insensitive to:

- The use of noncity specific dilution
- Sunlight intensity
- Diurnal emission patterns

Other limitations of EKMA noted were:

- Limited spatial representativeness of the design value and EKMA results
- No variable reactivity
- Direct relationship assumed between ambient concentrations and emissions that may overweight or underweight control strategies
- Frequency of occurrence of high ozone concentrations not considered
- Minimal sensitivity of EKMA to transport values and additivity

Upwind transport values and additivity were not not available for Montgomery (Dayton) County and the surrounding area because no monitor met the criteria to estimate these parameters. Hence, the basic EKMA approach utilizing the default parameters published by EPA was used along with the design value of 0.19 ppm for Dayton. The EKMA calculations resulted in a 62 percent reduction in hydrocarbons to meet the present ozone standard of 0.12 ppm. Linear rollback was also used to estimate hydrocarbon reductions needed to meet the ozone NAAQS. This method required a 40 percent needed reduction. Dayton preferred the results of the EKMA procedure primarily because the theoretical basis was better, but also to provide a more stringent hydrocarbon reduction to insure that the NAAQS would be met by 1987. Both methodologies were submitted in the SIP.

6.4 METHODOLOGIES USED IN PSD PLANNING

6.4.1 East Bend

Modeling of the proposed East Bend Power Station (Boone County, Kentucky) was performed in 1974 using the modified AQDM. Modifications included:

- Briggs plume rise
- Terrain considerations
- Windspeed adjusted for stack height
- No sector average of concentrations in 3-hour and 24-hour estimates

Four other sources included in the SO_2 analysis were the Miami Fort, Ghent, and Tanners Creek power plants, and the Dupont sulfuric acid plant. Cincinnati Airport data for 1964 provided observations thought to be most characteristic of the high plume height. Modeling results determined that the East Bend facility was in compliance with the allowable SO_2 PSD increments.

For TSP analysis, the SO_2 concentrations were prorated for expected TSP emissions. Concentrations were found to be in compliance with TSP increments. No fugitive sources were considered in the analysis.

6.4.2 Patriot

The proposed Patriot Power Plant in Switzerland County, Indiana, was modeled using the RAM model, modified for receptor elevations. The emission data base included all major sources located within a radius of 32 km from the site of the proposed Patriot plant and as such included emissions from the proposed East Bend plant. Cincinnati surface and Dayton upper air data

for 1964 were used for the RAM analysis. Area TSP sources on-site were projected to have a maximum impact of 1 $\mu g/m^3$. The contribution from both the Patriot and the East Bend plants did not consume the allowable PSD increments for either SO_2 or TSP. Based on modeling and monitoring at the Potomac Power Station in Washington, D.C., the Patriot plume was judged to have a minimal impact on nonmethane hydrocarbon to oxides of nitrogen ratios compared with those from the Cincinnati Metropolitan area. Although no modeling was performed, the operation of the Patriot plant was estimated to increase sulfate formation locally and increase reactivity downwind (50-100 km).

6.4.3 Ghent

A 201-m stack addition to the Ghent Power Plant in Kentucky was modeled using the CRSTER model, 1964 Louisville surface meteorological data, and 1964 Dayton upper air data. One 3-hour violation was estimated, 1342 $\mu g/m^3$ of SO_2. Further modeling performed using PTMAX, CRS-1, PTMTP-W, and terrain models (not specified in EPA 904/9-78-014) and emissions from the Ghent, Clifty Creek, Wise's Landing, and East Bend power plants indicated no violations of the SO_2 or TSP NAAQS. No estimate of PSD increments was given.

6.4.4 Trimble County (Wise's Landing)

In the course of preparing the Environmental Impact Statement for this proposed facility, several methodologies were attempted. The initial modeling is not reported in EPA 904/9-78-017. The most recent modeling using a multisource CRSTER

model focused on the potential impact of the Wise's Landing facility as well as its interaction with the Clifty Creek plant. To improve modeling, it was supplemented by onsite measurements and emission estimates. No violations of the NAAQS were found, and compliance with the SO_2 and TSP PSD increments were demonstrated by adding the modeling results to baseline measured air quality in the region. Concerns noted at the public hearing included:

- Interaction between the Wise's Landing and Clifty Creek plants
- Potential long-range transport
- Ohio River corridor effect not considered
- Cumulative impact with other sources not considered adequately

REFERENCES FOR SECTION 6

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*UNAMAP has now been expanded to include 11 commonly used air quality models. The 11 computer codes include PTMAX, PTDIS, PTMTP, HIWAY, PAL, APRAC-1A, CDM, CDMOC, CRSTER, VALLEY and RAM.